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WARFARE OF THE FUTURE

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Volume Five

WARFARE OF THE FUTURE

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CORPS OF ENGINEERS, UNITED STATES ARMY

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Introduction

For men as for nations a most important and difficult acquirement is a just sense of proportion. The rolling pebble under our feet does not fail to annoy for the moment and occupy our closest attention while we forget the ethics of the dust and the silent spheres about us where each atom is playing its allotted part in the evolution of worlds and systems. A shadow slips across our path; we glance upward at the gathering storm and hurry to shelter, with scarce a thought of the grateful rain that will germinate the seeds for next year's crop or of the ever-radiant sun putting forth its energy in beneficent forms, the great material source of man's activities.

This sense of proportion is rarely a natural gift. Individuals and societies must be educated to it, and usual educational methods seem to work in precisely the opposite direction. For instance, the varying scales of maps in our schoolroom geographies result in distorted and ineradicable ideas as to the relative size of the different countries of the world; also witness the false impressions of the great events of history, given children by the average textbook.

The same tendency toward distortion may be observed in relation to the current questions of the day. Our mental vision lacks perspective and cannot focus accurately at such close range unless we deliberately set ourselves to study with scrutinizing care the past and to peer into the future. We see some things too large and others too small. To contemplate for a moment the proposition that events as they occur are truly the resultant effect of all preceding causes may make us cast an anxious eye at the swiftly moving train of causes within our immediate knowledge and estimate what dire resultant the future may have in store.

The deadly conflict in progress across the seas stirs us to sympathy for our humble brothers of all nations caught within the mighty cogs of war. We feel keen resentment against those rulers, classes, or combinations whom we believe to be immediately responsible for their dire distress, but dimly do we discern the real causes of the mighty struggle deeply rooted in the distant past, in the jealous competition of rival nations, in the self-seeking that leads one to gain advantage at the expense of another, in selfish disregard of the rights of the human race as a whole, forgetful of the brotherhood of man, in the plain neglect of the golden rule. Still fainter impressions reach us in the noisy world of business of the possible effect of our own present activities, of what may be the resultant in a not far off future of all the causes now in operation, and of the part that America is to play in the future concert of nations.

Introduction

Preparedness is a word often on our lips, and the urgent need of real preparedness occupies the minds and hearts of a few faithful ones keener sighted than their fellows, but to the great mass of us it is as "sounding brass and a tinkling cymbal." We do not deep down in our hearts realize the need; we lack the perspective, the aptitude to judge events past and future in their just proportion. Will education give us the needed foresight, or are we doomed to learn the lesson in blood and humiliation?

For the sake of our country and our homes let us look at facts soberly but keenly, and with rare judgment see to it that our leaders act quickly and with discretion while there is yet time for informing themselves as far as human vision goes of the mighty events against which we should prepare ourselves and of the methods whereby the great heart of the nation is to be stirred into timely and intelligent action.

This small volume aims modestly to dig over a little patch of ground, to plant a few seeds in orderly fashion in the hope of a crop not entirely without utility. It aims to lend a hand to those who, earnestly desiring national preparedness, will try to throw some light based on studies of the past and present on what we may reasonably expect and prepare for as warfare of the future.

We shall try to remember the difficulty of making a correct estimate of new and conspicuous methods, popular perhaps, and sometimes given undue prominence and a false amount of importance on account of their very novelty and picturesque character. We shall constantly stand on guard against our own habitual lack of a just sense of proportion and endeavor to fit new methods and applications of new agencies into their proper place in the established and ancient art of war. It has generally been found that new instrumentalities for carrying on the business of the destruction of the enemy's armed forces have not in the least changed the fundamental principles of warfare, although they may have changed in certain important respects and under special conditions the application of those principles.

For example, improvements in methods of observation due to the use of captive balloons and airplanes, render the concealment of the position of guns and intrenchments more difficult and at the same time more necessary than ever before, but that does not alter the fact that the prime and essential purpose of fortification for riflemen and emplacements for artillery is to make more effective the fire of the arm in question. The fact that the use of heavy mobile artillery and high-explosive shell makes it possible to destroy and absolutely efface ordinary trenches, and hence to drive the defending troops deeper into the ground, does not change the principle that the defender must, as soon as he can, advance from his fox holes and meet the enemy hand to hand in the effort to destroy the latter's armed resistance.

Introduction

The purpose of this volume is to bring together in simple and logical form the adopted principles of warfare as given in the best authorities of our own and other countries, and to add to them the methods and conspicuous applications of new agencies observed or reported from the several fronts in the present European War.

A little reflection will convince us, however, that the new warfare is only a modern application of long-tried-out principles extended to meet new conditions, new weapons, and new agencies for destruction—merely a new phase of an ancient art.

The principles of fortification do not change, though the methods of applying them vary from age to age, from war to war, depending upon many and various considerations, but chiefly upon the character of the weapons employed by the fighting nations. Keeping in mind the modifying effect of the weapons used, we may trace these principles throughout history and find them exemplified wherever men have contended for the mastery and the possession of ground—in the walls of Troy; the Roman camps; the castles of the Middle Ages; the ditch and scarp wall with earthen ramparts slowly following the introduction of gunpowder; the geometrical forms of the seventeenth century, where the bastioned trace achieved fame under Vauban and continued to prevail with minor developments and changes throughout the eighteenth century; the polygonal enceinte with powerful frontal fire and less confined interiors; the provisional lines of Torres Vedras in 1810; and in the latest form of battlefield intrenchment, now called trench warfare, dating from about the middle of the nineteenth century.

In every case the object sought was to prevent the enemy from taking possession of the ground defended, to hold on as long as possible, and to do this with a force relatively smaller in numbers than the assailant; briefly, to hold superior forces in check for as long a time as possible, and so to gain time for the further concentration of troops, supplies, and armament wherewith to organize a successful offensive.

It is evident that to achieve success the defending troops will, like the assailant, often undertake operations that at certain times and places present a clearly offensive character; these constitute the aggressive defense. It is accomplished by means of counterattacks executed by troops not engaged at the moment the enemy approaches the position, and later by offensive returns, whose purpose is to drive the enemy from ground he has captured. The organization of the position should afford facilities for such counterattacks, and in all preparations for defense careful solicitude for freedom of maneuver should prevail.

Training in trench warfare is important, as we may be forced against our will, like the Germans and the Allies, to fight from trenches or to gain time; or, on the other hand, we may compel an invading enemy to a stand and make him dig in, in which case we should know how to attack an intrenched position. Both defensive and offensive methods must be thoroughly learned and practiced; for if our knowledge is limited to the use of trenches, though it be offensive and defensive, and if we are lacking in the warfare of the open field, an enemy better instructed in the latter will so maneuver and outgeneral us that we shall never get a chance to establish ourselves behind defensive lines with secure flanks, or to compel him to adopt such a course. It is clear then that we must understand warfare in all of its phases as practiced by the most experienced and warlike nations and according to principles that have in the past brought ultimate success; otherwise we are subjected to disadvantage from the outset. The skillfully maneuvered army will always be a move or two ahead, will seize without hesitation the strategic points, and will always have superior forces at the point where we are weak.

Trench warfare, as popularly known to-day, is but a special phase of a complicated art, and if we are blind to the other phases we shall be as fuel to the flame when the great calamity comes upon us. War is essentially a contest in which all the resources of nations must be thrown into the scale, and with the stupendous forces of men, materials and scientific methods available at the present day the nation that can fully utilize them and bring them to bear promptly and in preponderance at any given time and place will win the day.

While knowledge of all the arts of trench warfare and intensive training for that mode of combat are of the greatest importance to the troops of the belligerent nations who, with continuous lines and unturnable flanks, have come to an impasse in northeastern France, it would not be wise to base on these conditions a general rule for the training of mobile armies. Attention need only be invited to the emphatic advice of all writers on the art of war that fortification and intrenchment are but a means to an end, that the trenches are the passive element, closely related to, and dependent upon, fire action and the will and ability to maneuver, and forming with the two latter elements a combination which, if judiciously applied by a commander, will surely bring success.

A passive defense conducted as an end in itself is doomed beforehand to certain defeat. In defensive as well as in offensive operations fire action is only a means used to make ready for forward movement. In the defensive this means is rendered more effective by the previous choice of the ground, but the forward movement of the troops is still the essential process necessary to break down the armed resistance of the enemy, and drive him back decisively after he has been sufficiently weakened by the defender's fire.

Given a proper sense of perspective, our studies of the European War with a view to preparing ourselves for a similar grievous event will not therefore be limited to the study of a single front, like the intrenched line from the North Sea to the boundary of neutral Switzerland, of a single method like the attack and defense of trenches, nor to a few conspicuous agencies like aircraft and submarines. We shall take a broader view, examine all fronts, operations at different stages of the war, methods of attack in the open field as well as in or from trenches, and new agencies in their relation to the old. Aircraft and submarines have not yet proved deciding factors in the war, and their direct effect may never be of extraordinary importance. The battle fleet may still control the sea in spite of the best submarines in the world. The airplane, however, has greatly extended the power and efficacy of the artillery by thorough reconnaissance and observation of fire. The automobile increases the effectiveness of known agencies, namely men and guns, by the prompt and certain delivery of supplies and ammunition in quantities unheard of before.

Careful study and reflection should be made of the early operations of the war, the swift mobilization and the offensive designed to destroy the enemy before he was prepared; the measures taken on the other hand to resist this offensive and to gain time for mobilization and concentration and the accumulation of supplies. The handling and supply of the great masses and columns that overran Serbia in a most difficult terrain and the lightninglike strategic moves against Rumania by the Teutonic armies, will provide material for careful study of the most valuable and instructive character.

The three great military arts or branches of military art—strategy, logistics, and tactics—are more important than ever in view of the larger bodies of troops that must be moved and supplied and handled with security and effectiveness.

Strategy is the science of projecting and directing important military movements or operations, especially the skillful handling of masses or combinations of men not actually engaged in battle or under the direct fire of an enemy, and securing points or lines most favorable for supply, attack, defense, or retreat.

Strategy has been generally defined as the art of directing armies in the theater of operations, and tactics as the art of disposing and maneuvering troops on the field of battle. Tactics is also defined as the art of military and naval evolutions and the art of handling troops in the presence of the enemy.

Logistics is that branch of the military art which embraces the details of moving and supplying armies.

Warfare of the Future

I

Preparations for War

It is easy to understand principles if we can see their application to ourselves. The United States, if drawn into a conflict with a first-class power or combination of powers, is not likely to send expeditions across the seas to invade the territory of distant powers. It will in all probability wage a defensive war, but this should not be understood in the least as meaning that offensive tactics and powerfully aggressive action would not be used to deny an invader our shores or, if he should succeed in effecting a temporary landing, to drive him back into the sea. Should we unfortunately engage in war with our near neighbors on our north or south frontier we might have occasion to enter foreign soil with our armies. Either contingency shows plainly the necessity for a thorough knowledge on the part of our military authorities of the military geography and topography of the coastal and frontier areas through which military operations are likely to extend.

Military Information: This may be considered under two general heads—(1) that collected in time of peace; (2) that obtained by troops in the field after the outbreak of hostilities. The latter will be considered in detail under the head of Reconnaissance.

Information in time of peace should be collected, classified, indexed, and made available for the use and study of all high commanders by the General Staff of the army. It relates in general to the geography, resources, and military strength of the various nations and enables the War Department to decide upon the size of an army or expedition, the proportion of the different arms, character of clothing, equipment, etc., that may be necessary in the event of war. The collection of information of similar character, but in much more detailed fashion, should be made in regard to our country also, just as a commanding general in making up his estimate of the situation thinks of considerations affecting the enemy and considerations affecting our own forces.

Population: All facts in regard to the entire population should be carefully analyzed and classified. These may be obtained largely from census reports. Facts of military value are the rate of increase; the number of males that become of age each year and the number available for military service; the strength, composition, and training of the armed forces; the number, character, and training of reserves; the periods and places of maneuvers; the methods, places, and speed of mobilization. The industrial population of our own and foreign nations should also be studied with a view to determining how many can be spared for military service or for special services with the mobile forces in time of war, and how many and in what lines they can be replaced by women or by disabled or partly disabled men.

Resources: In the matter of resources, a nation should first determine the character of supplies of all kinds it would be necessary to have on hand to maintain munitions of war in ample quantity for any probable period of hostilities. At the same time as full information should be obtained as to supplies necessary for the use of the people of the country distinct from those relating purely to the condition of war. With these data as a basis the resources of the country should be examined with a view to determining if any vital or even important article is lacking, and more than this, any element necessary to the making up of any absolutely necessary article. As an example, the present war in Europe has developed, in so far as Germany is concerned, a shortage in fertilizers necessary to maintain the soil; this war also has brought to light in our own case the absence of sufficient nitrates to maintain even the most modest supply of high explosives.

Having determined the shortages, if any, in its own resources and those of a possible enemy, a nation should proceed to arrange for a certain supply of elements to fill its own needs, and should endeavor by every means within its power to insure that the shortages of the intended enemy shall not be made good. This may be accomplished by the nation having the more powerful navy by a blockade combined with a declaration that such articles are considered contraband of war, or it may be accomplished by determining the sources of supply and arranging in peace to secure control of such sources.

Transportation: Knowledge of the number, character and tonnage of vessels owned and the commerce carried on by foreign nations will enable us to estimate the probable number of ships that would be available for transports in an oversea expedition. All information for possible operations by ourselves on the sea and by land in our own territory or across the frontiers should be collected and tabulated in convenient forms. We should know at once when the need arises the railroad routes in different areas or zones, the number of cars of different types available, the loading and switching facilities, the connections with trolley lines and roads and inland waterways. An accurate census of vehicles—wagons, carts, automobiles, motor trucks, traction engines, road rollers, etc.—should be made for each large city, town, and rural neighborhood.

Terrain: Information as to the terrain is given by accurate geographic, topographic, and hydrographic maps or charts, purchased or constructed; detailed descriptions and photographs of harbors, coasts, landing places, piers, rivers, canals, roads, bridges, and fords. In terrain of our own country or over the frontiers in regions where operations are likely to take place accurate maps on large scale with systems of squares or rectangular coordinates should be constructed, and upon them should be shown every topographic feature, natural and artificial, of military importance. These would serve if necessary for the construction of trenches and for artillery use in locating and identifying targets. Maps of France of this character are said to have been made long before the present war.

Espionage: This seems to be practiced extensively by at least some of the European nations, and is regarded as part of the necessary preparation for the event of war. It is concerned with acquiring secret information through innumerable agencies and channels and with obtaining such control or influence in various activities as might be turned in time of war to the disadvantage of the enemy. For example, by interfering with the service of the supply or manufacture of munitions of war or the collection of raw materials or accessories concerned with such manufacture; or again, by employing agents to control such activities in neutral countries to prevent or cripple such supply or to send out products that are inferior or unsuited or do not fit exactly to the service for which they are intended.

Communications: The organization of agencies during time of peace for carrying on secret communication when war breaks out should receive the attention of the information division of the staff.

Methods of Warfare, Weapons, and Matériel: Full and detailed knowledge, constantly kept up to date should be accumulated by our experts on these subjects in the military, naval, and consular services, and close touch should be maintained with all new inventions that may be useful to us in the operations of war or to a possible enemy. For example, we should get accurate data as to the design of all the new artillery that has come into use in Europe, with calibers, range tables, character of ammunition, methods of emplacement, etc. We should have designs of the latest range-finding apparatus and of the most effective airplanes of the several types devised for the different services, such as scouting planes, fighting planes, bomb-dropping planes, etc.

War Plans: These would include a correlation of all the available information concerning a possible enemy, his points of attack, and our own forces and dispositions to meet and overcome him. War plans should be kept constantly up to date and be ready for use at a moment's notice. They should represent the very acme of order and system, so that upon the imminence or outbreak of war with any nation or combination of powers orders would go forth instantly and automatically putting into motion the vast machinery of our resources. The impulse would proceed from the highest command through definite channels, and finally reach the individual soldier and citizen whose duty is specifically laid out for him and in whose instant response to the summons begins the segregation of men and materials into groups and larger and larger units at designated points of collection until a great tactical unit like a division is formed ready to hasten to the danger point and offer armed resistance to the foe, while groups of citizens supply the necessary transportation, produce and accumulate munitions and supplies of all kinds, and operate in organized industrial bodies to insure the steady flow and maintenance of all that is needed to keep the armies equipped and ready for long-continued and aggressive action. Thus, like the wheels and levers in a perfect running machine, each will do his or her part and the whole will accomplish the purpose of being superior to the enemy at the point of contact.

War plans also should put into operation all the other activities and agencies that will operate to our own advantage and to the disadvantage of the enemy.

Complete war plans of a nation must contemplate combined military and naval operations, and for this purpose a thorough understanding and accord and a close relation between the two services is essential.

II

Organization for War

Besides the organization and grouping of the eligible males of a nation into tactical units, provision must be made for the training, discipline, and physical development of the men, and for their officers' training in the methods of attack and defense and in the handling and care of men in campaign. Then arrangements must be made for the mobilization of units, generally at some center in each State in our country, and for their concentration at some point near the probable theater of operations. Our authorities should at an early day provide proper and spacious division concentration points, at numerous localities convenient to our coasts and frontiers, suitable both for peace training and maneuvers and for actual concentration in time of war where an advance is to be made across a frontier or dispositions are to be made to resist the landing of an oversea enemy.

Organization of Industries: This is a vast field in itself. All industries should first be classified and listed with full description as to capacity, location, availability of raw materials, etc. Then, according to circumstances, definite plans should be made (1) to expand the output when the nation requires; (2) to turn their energies partially or solely to the manufacture of munitions or accessories; (3) to provide regular industries with standard plans, templates, or models of articles required by the military forces so that the manufacture of these could begin on short notice and proceed with the necessary speed; and (4) to study the question of coordination of design so that articles, implements, tools, and vehicles commonly used for agricultural and commercial purposes may be readily adapted or used unchanged for military purposes.

In the great industrial establishments also groups of specialists should be organized who might in war be transferred bodily to the military or naval service for work to which they are adapted, such as the operation and repair of searchlights, automobiles, aircraft, as well as in the more usual crafts and trades.

In connection with the foregoing, attention must be called to the fact that the volunteer system of raising armies is one which tends to prevent the organization of the industries referred to. Our past experience is filled with instances of men volunteering for service with the army in war who could accomplish results of infinitely greater benefit by remaining at their normal avocations. It is essential in time of war that the financial, professional, and industrial life of the country proceed not only as in time of peace, but with far greater efficiency. The interruption of these by the withdrawal of trained men is liable to counterbalance any service such men could perform with the army. It is the young soldier without business, professional, or family obligations, officered by the professional soldier who has made war a life's study, who should fight our battles.

Organization of Resources: The accumulation of supplies and their maintenance during the war are of the highest importance. System, classification, the prevention of waste, the utilization of by-products, the collection of used materials, economy in food and dress, will here work wonders, and we should consider and practice these measures before a war comes upon us. The result will be of individual and national benefit and may become one of the prime factors in keeping us out of war by the development of a national character that will command respect, admiration, and affection among all nations and avoid the resort to force which is, after all has been said, the brutish and inhuman way of settling the difficulties our prior mismanagement may have brought upon us.

Closely connected with the above idea is the organization of tools, implements and materials for military work in case we have to use them. For instance, if it became necessary to put an enormous force of men, soldiers, or laborers to work fortifying or intrenching a position in one of our coast defense areas, and the work had to be done in a very short time, often in a few days in these days of swift and sudden attack, we should have to buy up and gather together all the tools, barbed wire, and timber of the vicinity; the market would be emptied, prices to the government would rise, and the defense might not be successfully made. Therefore inventories before the war should be made of all such tools, implements, and material distributed among the inhabitants of both city and rural districts; those ordinarily in stock in the given area, those that could be manufactured or produced in the area, and those that can be drawn from other markets and areas.

For certain classes of materials this plan would seem to be better than buying up and storing enormous quantities that might deteriorate and become worthless long before the occasion for using it arrived.

Organization of Transportation: Inventories and classification again form the first step and should be extended to include horses and mules, animal-drawn vehicles, automobiles and autotrucks, motorcycles, and traction engines and tractors. Arrangements should be made whereby the owners of all these means of transportation should voluntarily offer them for the service of the state when needed for the common defense. Each district, according to a systematic scheme, should be required to furnish, when the call for mobilization goes forth, a definite number of each kind of animal or vehicle, the number depending upon the extent of mobilization and the forces required by the nation at the moment.

A designated bureau of the War Department, probably the Quartermaster Corps, should have on hand available at a moment's notice and constantly kept up to date a schedule giving full and detailed information concerning all American ships and also concerning foreign ships that frequent our harbors. This should include their size, tonnage, engines, cargo space, speed, their adaptation to the carrying of animals, troops and supplies, and plans for any changes necessary to properly fit them for such transport service. These plans for changes should be complete in every detail ready to turn over with the order for work to the proper constructing agencies so that they can be made in the minimum of time.

Standard loading tables for railroad and water transportation should be prepared after careful study and actual trial, when possible, and be ready to furnish to commanders, quartermasters, transportation agents, and others charged with the movement of troops and supplies at mobilization points and ports of embarkation. It should be well known to all these just how many cars, for instance, it requires to transport a battery of field artillery or a battalion of infantry or engineers or other unit fully equipped and provided with its proportionate share of wagon transportation, kitchens, etc.; into how many trains these cars should be organized; how they should be arranged in the trains, etc. Similarly the tonnage required per man, horse or mule, and wagon or gun should be figured out and tables made showing the convenient and economical loading for ships of certain classes and tonnage, due regard being given to keeping tactical units together and providing each with its share of sanitary personnel and supplies. A matter of the greatest importance is the order in which the cargo must be unloaded for making a landing in the face of probable resistance. At least one oversea expedition is said to have arrived off the proposed landing place with cargoes so arranged that they could not be unloaded with speed and safety and that the expedition had to return to its port of departure, unload, reload in proper order, and lose many weeks of most valuable time as well as the opportunity of surprising the enemy.

Mobilization and Concentration: Assuming an effective system of mobilization whereby the available men and resources of a nation will instantly, upon receipt of the impulse from the supreme authority of the land, begin to gather into groups and form nuclei at designated stations and depots, and assuming this process completed in the minimum of time, the next step is to concentrate the small units into larger groups at points convenient and appropriate to further training or to an advance against hostile forces or for embarkation on board ships. There is an intimate connection between this concentration process and the organization of the railway transportation of a country and it is possible to lose a great deal of invaluable time by failure to realize the extreme importance of rapid and systematic movement at this stage of the military operations.

The following quotation from "Sea, Land, and Air Strategy," though written in reference to mobilization, will apply aptly to concentration, which in a way is only a part of the process of mobilization:

Organization of Defensive Areas: Strategic studies should be made of both the land and sea frontiers, if the latter may be so called, and the belts of territory bordering these boundaries should be divided into defensive areas whose extent will depend upon the location and importance of the principal objective within them, the probable enemy and his line of approach, including his point of landing, the physical features of the area in their bearing on military operations, the fortifications, and the forces available for defense and prevention of the enemy's landing.

The military geography of these areas should be thoroughly studied by all concerned, specific units of the organized forces of the country should be assigned to each area, and plans for cooperation and for opposing the enemy upon all probable lines of advance or points of landing should be prepared in all detail. Local military or semimilitary organizations might be given specific duties and definite stations in their respective home areas and local interest counted upon as effective in devising and preparing a reasonable and sufficient scheme of defense.

In the case of coast defense, it may be said that the army and navy work directly together in a combined operation afloat and ashore. The routes of approach of the enemy are over the water, so our protective and reconnoitering screen must be afloat, and must be charged with prompt transmission of intelligence to the land forces.

The above suggests the organization of a harbor and coast patrol service which should include certain vessels of the existing government services—namely, the Navy, the Lighthouse and Coast Guard Service, the Engineer Department of the army, the Quartermaster Department, the several Surveys, and such privately owned vessels as might be suitable and desire to enroll.

This organization could probably be best handled by the Navy Department, and would naturally be closely connected with the operation of submarines from designated bases and of certain coast-defense vessels.

This organization is intrusted in some countries to the Navy Department and in others to the War Department. Germany is an example of the former. Her coast line is very limited and her army highly developed. The defense of that country against over-sea invasion is a very simple problem; her coast defense resolves itself into the protection of a few naval bases, and naturally the navy assumes the direction. On the other hand, in a country of extended coast line and many excellent harbors, only the more important of which may be permanently fortified, an attack from the sea becomes difficult to prepare against. Unless such a country has a navy of overwhelming preponderance, an invasion through the coast line, as has been repeatedly demonstrated, is entirely feasible.

Training: Many of the features noted as distinguishing the present war are due to the special conditions of the western front, where the entire frontier is occupied by the opposing armies, where there are no flanks to turn, and where the struggle is reduced to a warfare of position. In other parts of the war zone maneuver warfare is being conducted on an unprecedented scale and is of greater importance than ever in view of the immense armies to be transported, maneuvered, and supplied. The conspicuousness of trench warfare on the west does not in the least mean a diminished importance of maneuver warfare, and the training of all arms of the service for the latter as well as for the former demands our utmost attention in time of peace. Trenches are powerless unless manned by a well-trained and well-seasoned infantry that know marvelously well how to shoot, march, fight, and endure privations and punishment as well as how to dig trenches and make use of the ground. A hard riding cavalry, trained to fight on foot and to occupy trenches if necessary as well as to maneuver on the enemy's flanks and to outmarch opposing cavalry, is just as important as formerly. Field artillery of greater range, power, and mobility to accompany and to follow the mobile troops, trained in accurate observation and shooting in a constantly changing field of operations, fully equipped and plentifully supplied with ammunition of most approved type, has lost nothing of its former value.

Machine guns in increased numbers should be supplied to every arm, including the field artillery.

The special work of the supply, sanitary, engineer, and signal troops has become of more importance in proportion to the magnitude of the operations and the greater necessity for skilled and accurate detail in each service.

Special appliances, such as heavy artillery mounted on cars or hauled by tractors or autotrucks, aircraft, antiaircraft guns, portable searchlights of improved types, and all accessory apparatus of defense and attack, must be provided for our armies in order to meet effectively all devices that an enemy will bring against us, for should an attack unfortunately come upon us from without, it will come with an impetuosity, a suddenness, and a power intended to sweep us off of our feet before we can gather together the necessary resisting forces. Every means obtainable by the enemy and transportable to our shores will be brought into action, and we must be prepared in some degree to neutralize them.

III

Invasion from Oversea

The preparedness of the Great Powers for oversea expeditions, according to estimates by the General Staff for August, 1914, is shown in the table on the following page.

The quality, organization, and efficiency of these troops, except those of Japan, which demonstrated their excellence in the Russo-Japanese War, are now undergoing a supreme test of military strength on land and sea. In addition, where certain nations have transported troops by sea their capabilities in this respect have to some extent been shown. This test by the ordeal of battle is visibly demonstrating their organization, their fighting power, and the rate at which each is capable of developing and maintaining its military strength.

This evidence, produced under conditions of actual warfare, presents an example of the resultant efficiency of any nation that has developed a sound military policy: the soundest policy being the one which insures a successful termination of the war in the shortest time.

Our own preparations, therefore, must be to resist a combined land and sea operation of formidable strength. Where our harbors are

PREPAREDNESS OF THE GREAT POWERS FOR OVERSEA EXPEDITIONS

Nation	Strength of army	[3] Tonnage available of ships with capacity over—			First expedition using 50 per cent of tonnage given		Second expedition using 75 per cent of tonnage given		Time needed to—	
		3,000 tons	2,000 tons.	1,000 tons	Men	Animals	Men	Animals	Load and cross ocean with first expedition	Return, load, and recross with second expedition
									Days	Days
Austria-Hungary	4,320,000	....	762,756	....	72,000	14,000	108,000	21,600	20.7	40.4
France	5,000,000	....	1,705,931	....	160 931	32,186	243,295	48,279	15.8	30.0
Germany	5,000,000	3,569,962	4,018,185	....	[4]387,000	[4]81,270	[4]440,000	[4]94,600	15 8	30.8
Great Britain	[1]695,000	13,000,000	....	....	170,000	90,000	....	....	14.0	27.0
Italy	2,600,000	....	1,065,321	....	91,000	13,650	136,000	20,475	18.3	35.0
Japan	2,212,000	....	....	[2]1,013,985	95,745	24,416	142,622	36,623	22.5	41.0
Russia	5,000,000	....	428,019	....	37,630	7,940	66,444	11,918	20.5	40.0

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[1] 240,500 territorials. [2] Japanese field regulations indicate the intention to use steamers of 1,000 tons; for this reason and because of the large amount of steamers between 10 and 12 knots speed, all Japanese steamers over 10 knots speed and a thousand tons gross have been considered. [3] Fifty per cent has been assumed as the figure representing the amount of shipping in or within call of home ports at outbreak of war. [4] Using no ships less than 3,000 tons. Note.—The allowance prescribed in our Field Service Regulations of 3 tons per man and 8 tons per animal for ships over 5,000 tons and 4 tons per man and 10 tons per animal for vessels under 5,000 tons has been used in estimating the capacity of ships, except where the regulations of any country prescribe a different allowance. These allowances include rations, water, forage, etc., for the voyage and a margin for three months' reserve supplies. The tonnage allowance covers men, animals and all accessories and is sufficient to provide for vehicles, including guns. Fighting power is the result of organization, training, and equipment backed by the resources of the country. Available shipping is a matter of statistics.

adequately defended by seacoast guns we can generally deny the use of certain protected waters to the enemy's fleet, as he will not be likely to risk his ships in running past batteries, and direct naval attack would probably be not effective against guns well protected and concealed. The enemy "will therefore be forced to find some suitable place on the coast from which land operations can be conducted against the important coast cities and the rich commercial centers in the interior" ("Military Policy of the U. S.") He will endeavor also to secure control of dockyards, stores of coal and oil and other naval supplies, munition factories, wireless stations, advantageous ground from which he can bombard important objectives, naval, military, and commercial. "Long stretches of coast line between the fortified places lie open to the enemy. The only reasonable way in which these localities can be defended is by providing a mobile land force of sufficient strength, so located that it may be thrown in at threatened points at the proper time." ("Mil. Pol.")

An attempted landing on our shores will be in the nature of a raid or of a formidable expedition designed to secure an important base of operations and to prepare for following expeditions. It is probable that the enemy would first seize some outlying island where we could offer no resistance whatever and use this as a temporary stopping place from which at a favorable moment he would sweep down upon a selected and undefended stretch of coast. Either kind of attack assumes local naval superiority on the part of the enemy and control by him of sea communications.

Composition of Attacking Force: The enemy's expeditionary force will consist of transports carrying troops convoyed by war vessels of sufficient power to furnish ordinary protection and to assist with their secondary batteries in the proposed landing operations. The enemy's main fleet may be engaged elsewhere in dispersing, blockading, or destroying our main fleet. Our floating defenses would therefore also be secondary in their nature, and would consist of submarines and other torpedo craft besides the fleet of patrol and scout vessels, which, after giving warning of the hostile approach, would retire to shelter in convenient fortified harbors. The commander of the expedition would have made careful studies of the coast from maps, charts and all available information, but he would now endeavor by direct aerial reconnaissance to learn details as to the best landing places, their distinguishing marks by day and night; the character of the beaches, of wharves or landing piers, if any; the best routes to the objective; the dispositions of the defenders, and any other information not already available from studies made by the general staff in time of peace.

Methods of Landing and Attack: Assuming that the invader's naval escort has been, and is, sufficient to protect the helpless transports from the defender's floating armament, the next greatest difficulty and uncertainty in the way of a landing is the weather. For example, our own coasts, in general fronting the open ocean, may be impossible of approach for several days at a time, even in the best of seasons. Delay may therefore occur in beginning a landing, or it might be that the landing may be interrupted and the invading force be caught with part ashore and part afloat, a predicament that the defender would not be slow to take advantage of.

It is not probable that the attacking expedition would find adequate wharf room in any of the undefended harbors or inlets of our coast for a rapid disembarkation. Nor in general are there sufficient railroad facilities at such ports to promise a rapid advance upon a coast city suitable for a permanent base.

It is probable therefore that the transports would have to anchor at a considerable distance from the beach near a suitable base, and send troops and impedimenta ashore in small boats, lighters, barges, launches, etc. Usually several ships' boats are towed tandem by a launch. Many ships have launches that carry 100 to 250 men at a trip. Improvised landing places must be made, especially if there is any surf or ground swell such as exists on many shores in the calmest weather. Winds and currents add to the difficulties and delays of beach landings.

Many special arrangements must be made for landing animals and heavy guns and vehicles. Substantial lighters are carried by the English and Japanese. Cargo ports are cut in the walls of the ship to facilitate exit near the water surface. Floating wharves are constructed at both ship and shore end for the ferries carrying the troops. At the Dardanelles a large ship was grounded by having it run on the beach as far as it could go; then doors were cut in the hull at each end and this improvised tunnel furnished a convenient and safe landing place.

It seems, however, that with all the extraordinary mechanical appliances of the day and the experience that some foreign nations have had in transporting large forces oversea, a powerful foe, if he thought the prize worth having, could organize an expedition against the United States of sufficient dimensions to accomplish with certainty the object desired; at least, it is the part of wisdom for us to base our plans upon the assumption that he will do so. Local naval superiority must be assumed. Then the method followed would probably be to send an advance force of moderate dimensions, perhaps 50,000 to 75,000 men, to make a landing on a selected beach, push back the local defense, and seize a port suitable to serve as a temporary base and as a landing place for an expedition immediately following the first. The process might then be repeated until the invader had enough strength on shore and his line of communications and bases secure enough to justifiy an attack on an objective of the first order, including the capture from the land side of all defending coast fortifications.

The principle suggested is exactly that of a land force marching to a specific objective. The succession of groups of increasing strength from the point of the advance guard to the main body is intended to permit a gradual feeling out of the enemy, exposing at first only small bodies to the difficulties and dangers of contact with the hostile forces, giving time to the more powerful and more unwieldy units in rear to deploy and get into shape for action and permitting them to march in greater safety and with less danger of interruption to their designated stations, thus gradually accumulating strength until the moment for decisive action against the enemy arrives.

Defense Against Attack from the Sea: Coast fortifications, guns, mortars, and submarine mines constitute the fixed defense against the enemy's naval vessels, and protect certain harbors, channels, and water areas to which access will be denied the enemy.

For direct defense against an expedition landing on an unprotected beach or small harbor or inlet a close cooperation of navy and army will be required. The defending agency consists of fixed and mobile guns, fortifications, floating scouts, and aircraft, torpedoes and instrumentalities for firing them, including undersea boats, submarine mines, physical obstructions to vessels, boats and landing troops, electric searchlights and other means of illumination, proper communications, and a mobile defense force fully trained and equipped.

Where there is a long stretch of suitable landing beach and suitable waters in which the transports and the protecting vessels of the naval escort can lie and cover the landing with their guns, it will be very difficult to prevent the rush ashore of thousands of determined men. Therefore we must give the question much study, deciding first that we must stop them and then finding out the best means of so doing.

It is difficult to estimate even roughly the rate at which troops can be landed from a thoroughly organized and equipped expedition commanded by experienced officers. A thousand men and five guns an hour would seem to be a very moderate estimate, and we should probably find it desirable to make our preparations for defense against double that number.

The detailed elements of the defense to be considered and utilized as far as practicable are:

A small outpost to discover and oppose the landing.

A larger force rapidly moved to the point of attack, to hold until the main force can arrive. This may be cavalry, other mounted troops, or troops moved in automobiles.

The main defending army of the area.

Hasty intrenchments for the outposts and the first defenders strengthened by entanglements when possible.

Machine guns in ample quantities to reenforce the first small holding groups.

Field artillery in previously selected and concealed positions to destroy with shrapnel and shell the enemy's small boats, landing facilities, and personnel.

Heavy mobile artillery up to the heaviest calibers that can be mounted on motor vehicles or on railroad cars for use in destroying the enemy's transports and in combating the covering guns of the naval convoy.

Strategic system of roads and railroads parallel to the general line of the coast for the express use of this heavy mobile artillery.

Aircraft for reconnaissance, scouting, fighting hostile aircraft and bomb dropping.

Antiaircraft guns for destroying the enemy's air forces.

Searchlights and other means of battle-field illumination.

A complete system of roads and railroads in the defensive area for the movement of troops and their supplies.

Thorough organization of all the transportation of the locality, local resources, local defense measures.

An abundant supply of ammunition.

Training of the defenders in trench warfare in order to attack the enemy successfully in case he succeeds in landing and intrenching himself, or as a last resort to establish themselves in trenches with secure flanks with the intention of holding fast until reenforcements can come.

Intracoastal and transversal canals permitting interior communication between different seaports, important cities, natural inlets or bays of the coast where secondary naval vessels, submarines, supply boats, and small transports can proceed in sheltered channels unmolested by the enemy and not interfered with by storms.

Submarines and other torpedo craft to issue unexpectedly from hidden refuges and attack the enemy's ships.

IV

Invasion by the Frontier

WITH their heritage of past experience and their unceasing preparation and practice in the art of maneuver the Germans have again in 1914-15-16 given the world extraordinary spectacles of swift and irresistible invasion of the enemy's country in Belgium, France, Russia, Serbia, and Rumania.

Plans for the several campaigns would reveal in each case a definite objective, carefully thought out by the General Staff, which would include one or more strategic points or lines and certain strategic purposes. Such objectives might be the capital of the state; a strong defensive line with secure flanks; a line of railroad or a controlling railroad center; regions productive of supplies essential to the invader, as wheat fields, oil wells, iron, coal and copper mines; centers of commercial, financial or manufacturing importance; munition plants and depots, shipyards, etc., and the strategic purpose might be the turning of the enemy's flank, a break through his line with consequent separation of his forces, or a concentration of superior strength at decisive points.

This estimate of the situation, as it is called in the map problems and map maneuvers of our military schools and in field maneuvers, involves logical reasoning on the following points:

1. The mission of the agent charged with the work, whether that agent be Congress, the commander in chief, the General Staff, an army, or a commander of some specific military unit in the field.

2. Considerations affecting the enemy's forces, such as strength, and composition, character, location, and disposition, the terrain (land or sea) of the probable theater of operations (extent depending on the particular question in hand), questions of supply and lines of communication, possible and most probable lines of action involving a conjecture as to the enemy's objective.

3. Similar considerations respecting our own forces, concluding with what we regard as the best possible line of action to be taken by us under the circumstances and on which will be based the decision of the authority or agent charged with the mission.

It is clear that this method of reasoning may be applied to all strategic and tactical problems from the general plans of a campaign or war plans of a nation down to a particular military operation by a specific military unit—for example, an attack by a battalion, an advance by a division, the occupation of a defensive position, retreat by an army, etc.

Our general mission against an enemy who might be expected to cross the frontier is to defend our country from invasion, to prevent the occupation of any portion of our territory by hostile forces, to destroy the armed forces of the enemy.

Considerations Respecting the Enemy: The strength of expeditionary forces that the several Great Powers of the world might send against us was given in an earlier chapter and the approximate time for them to arrive at our coast line was noted.

Should such expeditions in whole or in part first land in Mexico or in Canada[1] for the purpose of establishing a base and effecting the necessary concentrations, we might be brought face to face with the problem of an invasion across the frontier. Such a method of attack would doubtless be combined with simultaneous or supporting attacks on some part of the coast line.

It seems improbable that any nation would invade us through Mexico unless with a view to establishing themselves permanently in that country, though the possibility of an oversea enemy making an alliance with our Southern neighbor should not be lost sight of. In either case, they might cross our frontier with a view to the destruction of any armed forces we might have or send there or to carry the war offensively into our territory. There are no great objectives on that frontier, and the distance to points or lines of strategic value is so great that an invading army would melt away before it could reach them.

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[1] It must be remembered that, in this discussion, Mexico and Canada are to be considered merely as countries lying on our frontiers, and not as the territory of any specific nation.

Our northern frontier therefore seems the one likely to demand attention. Its length, its accessibility from the sea through protected channels, the navigable rivers and lakes forming a large extent of the international boundary, the lines of internal navigation in Canadian territory, the proximity of the boundary to many localities of the highest strategic importance, and the various avenues of approach into our territory, all are questions to be carefully weighed in making up our minds as to the probable disposition and location of an enemy's forces. Space does not permit a detailed consideration of all these features, but it may be pointed out that an enemy could approach through the Gulf of Georgia or Juan de Fuca, straits at the Pacific end of Canada, and through the St. Lawrence at the Atlantic end and thence far into the interior and into the Great Lakes by protected canals or canalized rivers entirely within Canadian territory.

Method of Attack by an Invading Enemy: The successful invasions by Europe's armies have been accomplished by swift offensive action and blows directed straight at the hostile armed forces, the direction of advance being determined usually by some strategic objective that was covered or protected by the enemy army.

In strictly land warfare, where nations dwell on the same continent, invasions over the frontier separating two belligerents may be made successfully even though the invader may not have control of the sea. Under such circumstances an invasion may be precipitated before the formal declaration of war in order to gain time over the enemy and to reap the advantages of surprise. This grows less liable year by year as the preliminary steps in the mobilization of the great forces can hardly be concealed.

Conditions are somewhat different in the case of the United States of America, which, being the most powerful nation on the North American continent, need fear an invasion of magnitude only from oversea expeditions that might land in Canada, although local hostile forces might make vigorous attempts on a small scale and might even have success for a time. Control of the sea, however, would ultimately be essential for the invader to prosecute his task to a successful conclusion, and the element of surprise in the case of major operations would be largely lacking in view of the effective modern methods of getting and transmitting information and the time required for a great hostile force to cross the ocean.

We may estimate, however, that sufficient forces for the purpose in hand would be promptly dispatched to our shores, concentrated at suitable points behind the Canadian border, and that, in conjunction with expeditions simultaneously landed at one or more points of our own coast, the principle of the strategic offensive would then be applied with all possible vigor with the idea of bringing such pressure to bear on our people that they would yield to the demands of the enemy.

The strategical offensive has many advantages claimed for it by military writers, the principal ones being the moral effect on the troops and their leaders who are encouraged by the forward movement that seems natural and necessary; the simplicity and clearness of purpose, namely, to seek out the enemy's forces and beat him; the facilities for concentration afforded by advancing; the change of scene as the troops continually come into new country; and the effect on other nations may help or hinder in a variety of ways.

We may therefore expect the foreign invader when he comes will move at once across our frontier and attack the defending forces. The limitation in the way of movement into an enemy's territory is the ever-lengthening line of communications and the constant wearing down and weakening of the advancing force. Many a great army has melted away as it advanced. The invasion will, in consequence of the necessity of looking after the lines of communication and possible retreat, usually proceed by successive steps, with halts for time enough to secure the rearward lines and to accumulate supplies and reenforcements. Perfected machinery in the supply, transportation, and administrative departments will allow this to be done with the least loss of time. Should we be the invader, our method of procedure would be practically the same, namely, concentration near the border and rapid and vigorous advance by successive stages into the strategic centers of the enemy's country.

The Fortified City of the Future: The failure of the forts in the present war is due to several causes:

"First. Being built some years before the war, their position was accurately known to the enemy, thus losing the advantage of concealment; also, the details of their construction leaked out and guns were especially designed to destroy them.

"Second. Their armament had not been kept up to date and was entirely overpowered by guns of recent construction and of a type unknown to the defense.

"Third. The garrisons permitted the enemy to emplace his guns within their effective range, but beyond range of the forts' guns.

"The favorable effect of concealment, as a defensive measure, is illustrated by the operations against Ossowetz, and that of keeping the enemy at a distance by the operations against Verdun.

"The fortress of the future should consist of a large area so organized as to insure extreme mobility both to troops and guns. There will be no conspicuous forts of masonry and armor. Permanent gun emplacements should be constructed only at important points with the primary intention of compelling the enemy to lose time in bringing up his heaviest siege guns. The mobile guns would be located in earthen emplacements well concealed from the enemy's observers who might endeavor to direct fire on them. The point to be emphasized is that unless the garrison be strong enough in both mobile troops and mobile guns to keep the enemy from breaking through the line or coming within effective range of the city proper or other vital point or object to be protected, then there is no hope of offering a prolonged resistance.

"In view of the foregoing it is apparent that intrenched areas with mobile troops and guns are a more dependable protection than a stereotyped system of permanent forts."

Method of Resisting Invasion: In studying the question of preparation for invasion it is not unusual to go to one of two extremes: either to take a too general and sketchy view of the situation and forget the all-important details, or to look so closely at the small details and narrow routine of daily existence that we do not see the all-embracing general plan. Ability to grasp the general and the particular with equal clearness and accuracy of vision is perhaps a rare gift, but we can all at least see the importance of such understanding, and by cooperation and division of labor we can build up the structure of complete preparedness. An engineer designs a great bridge and makes a project for its erection, including the preparation of the river bed and the building of the foundations and substructure.

But before the mighty span is ready to carry the burden of traffic to be brought upon it every detail must be thought of and coordinated with the general plan; the smallest pin in the steel truss and the load of sand needed for the concrete of the piers are essential to the final result and each must arrive at the designated moment of time and take its allotted place in the growing work.

No time is to be lost. Our young men to-day should hear the call of universal service and should feel in their hearts the duty and honor of devoting a short period of their life directly to their country and of standing for a time in the front line of her defenders. The keenest minds of our foremost leaders, civil and military, in close cooperation, should to-morrow plan out in all its details appropriate legislation making provision for all to serve the country each to the best of his natural or acquired gifts. Statistics showing the number of men that become of age each year should be collected together. with accurate data as to their average physical qualities, in order to determine the character of training to apply to each class or group and the kind and amount of service to require of each. The question of the length of the training period, whether six months, one year, or two years, is most difficult to decide; the kind of training for the indoor season of the year that can be profitably undertaken, the moral and mental surroundings of young men brought together in daily and intimate contact from all the walks of life, must be most carefully considered, and above all, the guiding light of *organization* to bring into effective use our excellent materials.

Assuming that we shall in some way arrive at the condition of having an available military force, equipped and supplied, and an industrial organization to back up the military, we may now more intelligently consider the further steps to take toward resisting threatened or imminent invasion over our frontiers.

Plans of Campaign: These are formulated by the war-plans committee of the General Staff, who should logically be also the war-directing committee in the event of hostilities. The first step on the threat or imminence of war will be the strategic concentration in defensive areas for both the coast and the frontier, of the forces already definitely assigned to each zone, making first a distribution to especially vulnerable points, of the troops immediately available in the given area and providing for their relief by, or absorption in, newly mobilized forces as the latter advance to their points of concentration.

Bases and advance bases and lines of communication and supply toward each zone of operations would have been chosen long before and should now be mobilized or put into condition for immediate military use. Due consideration will be given to the safest and shortest routes consistent with the location of the probable theater of operations. Existing lines of roads and railroads and centers where many of these converge will often determine the enemy's probable direction of advance and the dispositions we make to meet him.

In order to gain the initiative rapid movement in the early strategical phases of a campaign is indispensable. A highly mobile force has the initiative in comparison with a slow-moving enemy and can compel the latter to conform to its actions; so mobility is an important factor greatly influencing subsequent events.

As intimated above, plans of campaign will probably have to include defense against combined land and oversea invasions, over the frontier and at the coast line. A partial plan against either kind of invasion exclusively would not be safe and might lead us into serious error. The difference seems to be this: in overseas attack the shore line offers the definite line of defense at which the enemy must be resisted and defeated; he must never be allowed to land. Against an overland attack across the frontier the line of defense is indefinite and will be of the enemy's choosing, or of our own, depending on the relative skill and rapidity of maneuver of the enemy and ourselves.

V

Information in Time of War

THE possession of accurate and detailed information as to the enemy's movements, his strength and dispositions, his depots of supplies of all kinds, his lines of communication and his country in respect to the features of military value, is very essential to a successful campaign and to a correct estimate of the situation.

"Information in the field is obtained from various sources—higher commanders, adjoining troops, inhabitants, newspapers, letters, telegraph files, prisoners, deserters, spies, maps, and reconnaissances. Knowledge of the terrain, always essential to a correct understanding of the situation, is obtained from a careful study of available maps, supplemented by thorough reconnaissance.

"All information of the enemy and of the theater of operations is sent to the intelligence section of the General Staff group of headquarters of units larger than a brigade. This section weighs and classifies the information brought in and supervises the preparation of the necessary field maps.

"An efficient secret service is organized as soon as practicable.

"In hostile territory influential persons, especially those supposed to be active in the enemy's cause, may be seized and their persons and houses searched. Letters and newspapers in post offices and files in telegraph offices are carefully examined and anything of importance sent to higher authority. Matter not of importance is replaced, if time permits; if not, the whole is sent to headquarters. Local maps of recent date may be of great value.

"When reliable information of the enemy cannot be obtained, it is assumed that he will act with good judgment.

"Information received by any person in the military service, and the action taken thereon, must be promptly reported to the proper military superior.

"Unless instructions have been given to spread false information, all persons connected with the military service are forbidden to discuss the military situation, plans, movements, etc., with, or in the presence of, civilians of any age, sex, or nationality.

"*Reconnaissance:* Reconnaissance is the military term used to designate the work of troops or individuals when gathering information in the field."

Reconnaissance has for its object to ascertain the minute topographical features and the local resources, with their distribution, of the theater of operations as well as to discover the disposition of the enemy and determine his movements and strength. The general topography of the country and its resources should be known from information gathered in time of peace, and general maps of the region on scales approximating one inch to the mile should be available for the use of the commanders of troops in the field.

Reconnaissance has been classified as strategical, tactical, and protective.

Strategical reconnaissance would usually be carried out by the cavalry and the air service before the armies had come within striking distance of each other.

Organizations equipped with airplanes are attached to forces of the strength of a division and larger. The extent to which the airplanes may be used for reconnaissance will depend largely on weather conditions, wind, fog, temperature, and on the character of the country, whether mountainous, forest-covered, or otherwise. The independent cavalry and the air squadrons must be regarded as in general complementary to one another.

"No doubt the development of aerial navigation has resulted in a great revolution in the methods of the battle field. Aerial reconnaissance would seem to have taken the element of surprise from the combinations of modern battle leaders." ("Elements of Tactics," Captain Forsyth-Major.)

Aircraft skillfully used will enable opposing generals to place the forces of both sides on their maps and make their plans accordingly. It will apparently increase the relative importance of skillful and rapid tactical dispositions and movements of troops and supplies. The methods of transmitting information from airplanes is not entirely satisfactory. Wireless telegraphy does not work as well as it does from airships. Message bags dropped from a great height by an airplane at high speed may not reach their destination promptly. The safe way is usually for an airplane to return to its headquarters, land its observer, who then makes his report in person.

As in any other branch of warfare, reconnaissance by aircraft is met with resistance, and the control of the air is struggled for as strenuously as is the control of the terrain between opposing armies in maneuver warfare by the independent cavalry. This is shown by the spectacular combat between hostile airplanes, the pilots of which maneuver for position while the observers use the machine guns furnished. In the lighter and speedier aircraft the pilot is alone and has to operate not only the airplane but also the machine gun. In many instances the light and exceedingly rapid machines are successful against those more formidable in size and armament. Ease of handling and ability to climb rapidly are decisive features. Flying corps men of experience state that they dread the antiaircraft guns more than the opposing machines. The latter they can see and prepare for, but the former are concealed and they know nothing of the attack until the shrapnel is bursting around them, or possibly until some vital portion of their machine is put out of operation, or they themselves wounded. There is no possibility of their resisting the attack—none of the thrill of combat.

The best method for avoiding antiaircraft gun fire consists in the rapid change of range as soon as the shrapnel bursts so that the enemy is unable to ascertain the speed and height. This is done by diving with the engine full on, in itself an exceedingly risky operation. The antiaircraft gun has forced the average reconnaissance to be made at heights of 12,000 feet and more. This requires the use of a powerful glass and telescopic cameras.

"On account of the limitations indicated above for aircraft reconnaissance in the theater of operations in maneuver warfare is largely made by the cavalry, which from the beginning of the campaign seeks to determine the enemy's strength and dispositions. It protects its own army against surprise, screens its movements, and insures the safety and success of the troops of other arms. The defeat of the hostile cavalry and its expulsion from the field are usually the best means to this end. As the opposing armies draw near each other, the cavalry endeavors to secure control of the ground between and bends every effort to that close and continuous reconnaissance of the enemy's forces that is vital to the success of the entire campaign.

"Reconnaissance by the independent cavalry will give, in a general way, the enemy's location for several hours, or even days, preceding contact of the main bodies. If this cavalry is strong enough to defeat the enemy's cavalry, it will be enabled to locate the hostile infantry and artillery and to determine their approximate strength. If weaker than the enemy's cavalry, it must rely upon the work of strategical and tactical patrols to obtain detailed information of the enemy, or it must be assisted by the other arms.

"In the latter case the advance guard of the main body will afford this assistance by stopping the advance of the enemy's cavalry and compelling him to deploy his infantry and artillery, in part at least.

"On very wide fronts an army is generally covered by two or more bodies of independent cavalry, each is informed of the extent of ground it is to cover and keeps in touch with the neighboring cavalry.

"The cavalry attached to an infantry division is called divisional cavalry. When the division is operating independently, the divisional cavalry acts also as independent cavalry; when the division forms part of a field army, the divisional cavalry is known as advance cavalry. It usually enters into the composition of advance, flank, rear, and outpost guards, and when so employed is known as advance guard, flank guard, rear guard, and outpost cavalry, as the case may be, and performs such reconnaissance as the situation demands.

"The extent of the infantry reconnaissance will not be so great where the air squadron and the cavalry are able to perform this service efficiently, as it must be in the absence of efficient reconnaissance by the other arms. In no case, however, can infantry reconnaissance, preceding or during combat, be dispensed with. Infantry and artillery cannot rely wholly upon cavalry or aero reconnaissance, but must conduct such close-in reconnaissance as is necessary for security and to determine their immediate dispositions.

"In the absence of cavalry, reconnaissance at a distance is made by infantry or scouts specially detailed for that purpose.

"Reconnaissance preceding deployment for action is of vital importance. On the information of the enemy and of the terrain obtained through proper reconnaissance combat orders are based. How complete such reconnaissance may be will depend upon the time that can be spared for the purpose without losing the initiative in action, upon the character of information desired, and upon the efficiency of the measures taken by the enemy to conceal his dispositions.

"In any advance toward the enemy the advance guard must be relied upon for such reconnaissance as is necessary, either to supplement the reconnaissance of other troops or to replace it when other reconnaissance is wholly wanting. It is important that the advance guard force the enemy to disclose his position and strength as early as possible. A strong force of artillery is most useful for this purpose, as it clears up the situation in a way that cannot be done by other troops, except by incurring heavy losses.

"In encountering the enemy in a position that is to be developed the advance guard must continue, by means of the advance cavalry, the reconnaissance begun by the independent cavalry or by other troops. The enemy will not disclose his position, particularly that of his artillery, until forced to do so by a determined reconnaissance which may call for the use of infantry and artillery in force before it can accomplish its purpose. The advance of the infantry will finally force back all advanced detachments of the enemy and bare his main position. The artillery will assist in this advance by opening fire on any targets of importance that the infantry advance uncovers. Finally, the enemy's artillery will be obliged to disclose its position by opening fire, either to stop the advance of the opposing infantry or to keep down the opposing artillery fire. The information thus gained of the enemy's position and strength will enable the leader to form his plan of attack.

"In the rencontre efficient measures for security on the march must be relied upon to take the place of the more complete reconnaissance, which the necessity of obtaining the initiative in deployment forbids. In an attack on a position that the enemy has had time to take up deliberately and to strengthen, time is not so important an element, and the reconnaissance preceding deployment must be as complete as may be necessary to determine the enemy's strength and dispositions.

"The infantry will keep up during combat such reconnaissance as will enable it to keep contact with the enemy, acquaint itself with the terrain in its front, and especially to protect its flanks and rear. The field artillery continues the reconnaissance called for by its tactical employment.

"During combat the air squadron will operate around the flanks and over and to the rear of the enemy's position, for the purpose of reporting his dispositions, the approach of reenforcements, or the beginning of his withdrawal from action. It will also be used to adjust artillery fire.

"During combat the cavalry will conduct an extended reconnaissance around the flanks and to the rear of the enemy's position, but such reconnaissance must be conducted by small detachments, in order that the main body of the cavalry may be kept close at hand to aid in obtaining success in the main battle."

When contact with the enemy has been established and the armies are approaching each other and maneuvering for favorable position prior to combat, much of the detailed information is gathered by reconnoitering patrols, frequently consisting entirely of infantry. This subject is covered so thoroughly in Volume III that only a reference is required here.

In trench warfare, which term may be used also to describe siege operations in future, reconnaissance will be entirely by aircraft. The day of the scout, who, leaving his own lines under cover of darkness, skillfully penetrated the enemy's lines, learned of his dispositions, and returned before dawn with information for his commander, has passed. A defender would be poor, indeed, if he lacked some airplanes and men skillful enough for a sudden dash under cover of favorable weather in which more information could be obtained in a few minutes than the scout could hope to gather, no matter how fortunate he might be. And it is certain that the commander of the investing force will be liberally supplied with captive balloons, dirigibles and airplanes.

An army can no longer hope to conceal its dispositions when driven to intrench, and the utmost skill is required to prevent discovery of such important positions as those held by siege and field artillery.

Efforts to render trenches inconspicuous have been more or less successful as far as observation from the ground is concerned.

The removal of the vegetable stubble or turf, the distributing of the excavated earth and the replacing of the turf, are all aids in securing inconspicuousness. Trenches are made to resemble the landscape in which they are. If they are in a brown mowed field hay is scattered over all fresh earth; if they are in pasture land all the dirt is carried carefully away or is spread out and sodded over.

The deep cuts following the contours with the many traverses necessary to limit the effect of exploding shell make the intrenched line readily discernible from above.

Messages, Reports, Maps, and War Diaries: In the field the term "message" is generally applied to written information sent by messenger or wire. Such messages should be brief and clear, resembling telegrams. The source of the information contained in messages is always given, the writer carefully separating what he has actually seen himself from that received second-hand. Most of the rules adopted to secure clearness in orders apply equally to messages.

A report is a more or less formal account of some enterprise, undertaking, or event, such as a march, reconnaissance, battle, etc. A report is usually drawn up at comparative leisure, is often the supplement and expansion of short messages, and thus possesses the value of greater detail.

In the field the maps available for general use are on a small scale. Those of our own country are prepared by the Geological Survey on a scale of 1:62500 (approximately 1 inch to the mile), with 20-foot contours. These maps are supplemented by field maps or sketches prepared from day to day. For facility in reading, military maps are made according to a uniform system of scales and contour intervals, as follows: One inch to 1 mile, V. I. 60 feet; 3 inches to 1 mile, V. I. 20 feet; 6 inches to 1 mile, V. I. 10 feet; 12 inches to 1 mile, V. I. 5 feet.

As a rule, road sketches are made on a scale of 3 inches to 1 mile, V. I. 20 feet; position and outpost sketches, 6 inches to 1 mile, V. I. 10 feet. The 1-inch map is used for extended operations; the 12-inch map for the war game or for the discussion of operations at maneuvers, and in siege operations.

As sketches must be made rapidly, often on horseback, unnecessary conventional signs are omitted. Sketches are useful to supplement messages and to elucidate reports of campaigns and battles.

A war diary is a record of events kept in campaign by each battalion and higher organization, each ammunition, supply, engineer, and sanitary train.

Entries are made daily and should form a concise history of the military operations. A day comprises 24 hours covered by the date.

Each day's record will commence with a march table, or statement of the operations or location of the organization, including an account of weather, roads, camp, health of troops, etc., and a statement of the supply of ammunition, rations, and forage. This will be followed by a chronological record of events, including time and place of issue and receipt of orders and messages, with a copy or a synopsis of contents.

U. S. ARMY FIELD MESSAGE
Communicated by
BUZZER, PHONE, TELEGRAPH, RADIO, LANTERN
HELIO, FLAG, CYCLIST,
FOOT MESSENGER,
MOUNTED MESSENGER.
(Underscored means used)

No.	Sent by	Time	Rec'd by	Time	Check

This Space for Signal Operators Only.

From Head of Main Body.
At Finnacom's Hill, Va.
Date 15 Sept. 16 | Hour 10:30 a.m. | No. 1

To Major Billings
Commanding Advance Guard.

I shall move with main body to your right and rear to Hill 400 northeast of Annandale. Hold enemy in position until I pass then follow me.

ARCHER,
Colonel, Nth Cavalry.

Received........

Unless necessary that the information be given, the place from which sent and the location of the officer to whom addressed are omitted.

Information is transmitted as follows:

1. By wire (telegraph, buzzer, telephone).
2. By visual signaling (flag, helio, night lamp).
3. By radio telegraph.
4. By messenger (foot, mounted, cycle, motor car, flying machine).

Information over considerable distances is usually transmitted by wire or radio telegraph. For short distances[1] and when other means are not available, information is carried by messenger. When messages are sent by wire or radio telegraph they are always handed the operator in writing. The telephone is not as accurate as the telegraph, and when used the parties concerned do the talking, if practicable. All available means are utilized to facilitate the transmission of information, and it is the duty of all officers to assist in the transmission of orders and messages.

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[1] For instance, at urgent speed and for distances up to about half a mile, a mounted messenger can deliver a message of 10 words in less time than the same can be delivered by wire.

In trench warfare all positions are connected by an elaborate system of telephones comparable to that of a city. This system is the nerves of the army. To avoid interruption the main lines must be buried deeply enough to escape destruction by artillery fire. Bombing of cable junctions was a feat frequently attempted by airplanes until these were carefully concealed.

VI

Security

SECURITY embraces all those measures taken by a command to protect itself from observation, annoyance, or surprise by the enemy.

Ordinarily this security is provided in part by the independent cavalry, which, operating far to the front, checks the opposing cavalry and sends in timely information of the movements of the enemy. But as a command is not always preceded by independent cavalry, and as this cavalry cannot always prevent sudden incursions of the enemy or discover his patrols, additional security becomes necessary. This is obtained by covering the immediate front of the command with detachments.

On the march these detachments are called advance, flank, or rear guards; in camp or bivouac they are called outposts.

The object of the former is to facilitate the movement of the main body and to protect it from surprise and observation; the object of the latter is to secure the camp or bivouac against surprise and to prevent an attack upon it before the troops can prepare to resist.

On the march these detachments facilitate the advance of the main body by promptly driving off small bodies of the enemy who seek to harass or delay it; by removing obstacles from the line of advance; by repairing roads, bridges, etc., thus enabling the main body to advance uninterruptedly in convenient marching formations.

They protect the main body by preventing the enemy from firing into it when in close formation; by holding the enemy and enabling the main body to deploy before coming under effective fire; by preventing its size and condition from being observed by the enemy; and, in retreat, by gaining time for it to make its escape or to reorganize its forces.

In trench warfare the service of security is simplified, but none the less nerve-racking on those detailed for the duty.

In front of the first line proper of the intrenched position listening posts and alarm trenches are pushed well forward at intervals to the front of the wire entanglements and as near the enemy as circumstances permit. These are occupied by a few men as sentries to watch the foreground. To enable these sentries to return safely to the main firing trench, and without masking its fire, a curved trench leads back to the latter, and this return trench is provided with a movable frame or cage of barbed wire so arranged that the retiring guards can pull it down into the communicating trench and cut off the pursuers. At the junction with the fire trench a second frame is lowered and fire is opened through a steel shield on the pursuing enemy.

The universal wire entanglement itself is an important element of security. It is built in a multitude of forms and provided with all manner of automatic devices, mechanical and electrical, for giving an alarm in case an enemy attempts to cut it or pass through.

Local reconnaissance by patrols is used at night to determine the strength of the enemy wire and the possibilities of the terrain. After the first few lines of enemy trench are taken it is most important to have scouts in advance of the attacking line to prevent running into machine-gun traps. All officers down to company commanders are provided with maps showing enemy trenches as determined by airplane photographs. Battalion and higher commanders have maps showing both their own and enemy trenches.

The front line of firing trenches corresponds to the line of resistance and provides accommodation for the maximum number of machine guns and rifles. They cover with their fire the advance line of listening posts and establish the line at which the reenforcements form in case of actual or threatening efforts by the enemy. Ordinarily during the daytime the front firing trenches are occupied by only a few riflemen on duty watching the front through loopholes or periscopes, and by machine guns whose crews are constantly on guard and ready. Artillery observers are also established in the front-line trenches or in convenient posts near by. They have verbal communication with the infantry commander and wire communication with the artillery commander of a certain battery or battalion assigned to cooperate with this particular section of trench.

Behind the firing trenches are lines of support trenches out of which open dugouts and shelters where the troops off duty can sleep, rest, and have their meals in comparative security. All trenches are systematically connected up by boyaux or zigzag communicating trenches. Cooperation of the artillery, machine guns and infantry is absolutely essential and must be carefully arranged for by a reliable system of signaling, visual and otherwise.

A number of special devices for observing the enemy in safety to the observer have been developed during the present war, such as trench periscopes, bullet-proof conning towers, etc. The latter are about one meter in diameter and two meters high and are made in three cylindrical sections for transportation, one fitting above the other, the top one being dome shaped and furnished with narrow apertures for observation. When set up there is a narrow entrance in one side.

This turret is installed at an angle in the trench line, being buried in the parapet with the entrance in the trench and the observing slits uncovered.

Aircraft are invaluable to the service of security in trench warfare. The extent to which the air service of European armies has been utilized in this service is indicated by the fact that on the western front the —— have some officers whose duties are to ascertain the exact train schedules on all railroads running back of the German trenches, and to notify instantly any departure from the schedule. In this way, only at night can there be any extended movement by troops without such being known at army headquarters.

General Principle of Protective Groups: As the principal duty of these bodies is the same, viz., that of protecting the main body, there is a general similarity in the formations assumed by them. There is (1) the cavalry covering the front; next (2) a group, or line of groups, in observation; then (3) the support, or line of supports, whose duty is to furnish the observation groups, and check the enemy pending the arrival of reenforcements; still farther in rear is (4) the reserve.

An advance or flank guard commander marches well to the front and, from time to time, orders such additional reconnaissance or makes such changes in his dispositions as the circumstances of the case demand.

In large commands troops from all arms are generally detailed, the proportion from each being determined by the tactical situation; but commanders detail no more troops than the situation actually requires, as an excessive amount of such duty rapidly impairs the efficiency of a command. As a general rule troops detailed on the service of security vary in strength from one-twentieth to one-third of the entire command, but seldom exceed the latter. When practicable, the integrity of tactical units is preserved.

In mixed commands infantry usually forms the greater part of the troops detailed to the service of security. Cavalry is assigned to that duty whenever advantage can be taken of its superior mobility. The kind and amount of artillery are determined by circumstances.

Engineer, signal, and sanitary troops are detailed when required.

The field trains of troops on this duty generally remain with the field train of the command, but if conditions permit they may join their organizations.

Troops on the service of security pay no compliments; individuals salute when they address, or are addressed by, a superior officer.

Machine guns increase the effectiveness of protective groups, their efficient use resulting from the ease with which they are placed in position and concealed from observation. They are valuable as an aid to infantry mainly at short and mid ranges and become especially effective in enfilading fire or in rolling up a flank. For outposts and advance guards they are useful in holding bridges, defiles, etc., until reenforcements can be brought up. They should not be used against thin or well-covered skirmish lines, but should be kept in reserve and their crushing fire delivered at a decisive moment. The mobility of machine guns is vastly increased by mounting them on motorcycles or automobiles, and they can thus follow the most rapidly moving troops and assist in the rapid utilization of the ground and in taking advantage of rapid changes in the situation.

All protective groups should be provided with efficient and rapid means of communication, sending messages, etc. For carrying messages by road a detachment of motorcycle or bicycle messengers should be attached to advance guards, flank and rear guards, outposts, etc.

PROTECTION ON THE MARCH

Advance Guards: An advance guard is a detachment of the main body which precedes and covers it on the march.

Its duties are:

1. To guard against surprise and furnish information by reconnoitering to the front and flanks.
2. To push back small parties of the enemy and prevent their observing, firing upon, or delaying the main body.
3. To check the enemy's advance in force long enough to permit the main body to prepare for action.
4. When the enemy is encountered on the defensive, to seize a good position and locate his lines, care being taken not to bring on a general engagement unless the advance-guard commander is empowered to do so.

5. To remove obstacles, repair the road, and favor in every way possible the steady march of the column.

Subject to variation according to the situation, one-twentieth to one-third of a command may be assumed as a suitable strength for the advance guard. The larger the force, the larger in proportion is the advance guard, for a large command takes relatively longer to prepare for action than a small one. In large commands it is usually composed of all arms, the proportions depending on the nature of the work, character of the country, etc. In open country it should be strong in cavalry and field artillery, but artillery is seldom assigned to the advance guard of a command not larger than a brigade. In such cases, however, when there is artillery with a command, an officer of that arm usually accompanies the advance guard for purposes of artillery reconnaissance. In swampy country or jungle it may be formed of infantry alone. When not preceded by independent cavalry, the advance guard must, as a rule, be strong in cavalry; in such cases the commander determines whether to attach all of the divisional cavalry to the advance guard, or to retain a part for some special service.

Engineers are usually attached to an advance guard to remove obstacles, repair roads, etc. Circumstances may require a bridge train to be attached.

The supreme commander generally retains control of the signal troops, and establishes such lines of information as he deems necessary. However, when the nature of the country favors communication by signaling, signal troops may be attached to the advance guard.

An ambulance company usually accompanies large advance guards.

The distance at which the advance guard precedes the main body, or the main body follows the advance guard, is stated in the march order. In small commands, where there is no difficulty in keeping touch with the main body, the march order generally requires the advance guard to regulate its march on the main body; but where the advance guard is large, or moves at a considerable distance in advance of the main body, the latter regulates its march on the advance guard.

While the distance between these two bodies should be great enough to prevent needless interruptions in the march of the main body, and to give the latter time to deploy should the enemy be encountered, it should never be so great that timely support of the advance guard becomes impracticable.

On receipt of the march order the advance guard commander estimates the situation and, at the proper time, issues the advance-guard order. This order divides the advance guard into its tactical components (advance cavalry, support, etc.), and gives the necessary instructions for each.

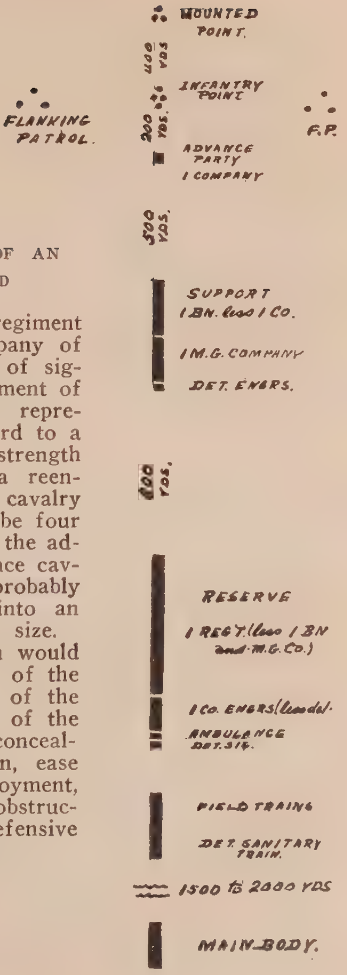
The advance-guard commander is mounted and goes wherever he deems his presence necessary, though his habitual station is at the head of the reserve, or with the support when there is no reserve. He conducts the advance so as not to interrupt the steady march of the main body, and, when ordered to move at a certain distance in front of the latter, maintains the necessary connection therewith. He bears constantly in mind the duties of an advance guard, and studies the ground with a view to tactical dispositions should enemy be encountered. (See diagram opposite.)

An advance-guard order generally prescribes the following distribution of troops:

Advance cavalry;
Support;
Reserve.

The manner in which the advance-guard cavalry is employed depends upon the situation. Its proper place is in the direction of the enemy, and generally all or the greater part is used as advance cavalry. If weak in numbers, it may be assigned to the support.

The advance cavalry is that part of the advance-guard cavalry preceding the support. It reconnoiters far enough to the front and flanks to guard the column against surprise by artillery fire, and to enable timely information to be sent to the advance-guard commander. If preceded by independent cavalry, the advance cavalry maintains connection therewith, except when prevented by uncontrollable reasons; if not preceded by independent cavalry, it pushes well out and endeavors to find the enemy, performing to a



ORDER OF MARCH OF AN ADVANCE GUARD

Composed of one regiment of infantry, one company of engineers, detachment of signal troops, and detachment of sanitary train. This represents the advance guard to a force probably the strength and composition of a reenforced brigade. The cavalry of the brigade would be four or five miles ahead of the advanced guard as advance cavalry. There would probably be no artillery put into an advance guard of this size.

The distances shown would vary with the mission of the column, the proximity of the enemy and the nature of the country as regards concealment from observation, ease of marching or deployment, and the existence of obstructions, defiles, good defensive positions, etc.

limited extent the functions of independent cavalry. Its commander should be bold, energetic, and capable; he sees that his command is supplied with articles required by patrols.

Following the advance cavalry is the support, varying in strength from one-fourth to one-half of the advance guard. In mixed commands it consists of infantry, to which engineers may be attached. If there is no advance cavalry, some cavalry should be attached to the support for reconnoitering duty.

As the support moves out it sends forward an advance party several hundred yards, the distance varying with the terrain and the size of the command.

The advance party supplements the work of the advance cavalry, reconnoitering to the front and flanks to guard the support against surprise by effective rifle fire. The patrol preceding the advanced party on the line of march is called the point, and is commanded by an officer or an experienced noncommissioned officer.

With the advance cavalry in front but little reconnoitering by infantry is necessary, and the advance party is relatively small—one-eighth to one-third of the support. If there is no advance cavalry, the advance party is made stronger (about one-half of the support) and the flanks are guarded, if necessary, by additional patrols sent out from the support and even from the reserve.

The support commander ordinarily marches with the advance party, but goes wherever needed. He sees that the proper road is followed; that guides are left in towns and at crossroads; that necessary repairs are made to roads, bridges, etc., and that information of the enemy or affecting the march is promptly transmitted to the advance-guard commander. He endeavors promptly to verify information of the enemy.

The reserve follows the support at several hundred yards distance. It consists of the remainder of the infantry and engineers, the artillery, and the ambulance company. The artillery usually marches near the head of the reserve, the engineers (with bridge train, if any) and special troops at the rear.

In conducting the reconnaissance the patrols are, as a rule, small—from two to six men. If additional protection is necessary, a flank guard covers the threatened flank. The flanking patrols, whether of the advance cavalry or advance party, are sent out to examine the country wherever the enemy might be concealed. If the nature of the terrain permits, these patrols march across country or along roads and trails paralleling the march of the column. For cavalry patrols this is often possible; but with infantry patrols and even with those that are mounted, reconnaissance is generally best done by sending the patrols to high places along the line of march to overlook the country and examine the danger points. These patrols report or signal the results of their observations and, unless they have other instructions, join their units by the most practicable routes, other patrols being sent out as the march proceeds and as the nature of the country requires.

Deserters, suspicious characters, and bearers of flags of truce,[1] the latter blindfolded, are taken to the advance guard commander.

Civilians are not permitted to precede the advance guard.

Communication between the fractions of an advance guard and between the advance guard and main body is maintained by wire, messenger service, or signals.

Advance Guard of a Small Command: In forming the advance guard of a command smaller than a brigade, the foregoing distribution is modified, depending upon the situation. A company or two usually sends forward only a point, a battalion or squadron, an advance party; but a battalion or squadron at war strength should put a company or troop in the advance guard and a regiment should put a battalion or squadron, if an enemy is liable to be met. Whenever the advance guard is less than a battalion, there is no reserve.

Advance Guard of a Cavalry Command: Cavalry marching independently adopts formations for its advance guard similar to those described above, though the distances are generally greater.

Advance Guard of a Division (Independent): Assuming that the advance guard consists of one brigade of infantry, one squadron, one battalion of artillery, one company of engineers, and an ambulance company, the distribution (with independent cavalry) might be made as follows:

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[1] See Rules of Land Warfare, U. S. Army, relative to reception of bearers of flags of truce, etc.

Independent cavalry.
(One or two marches.)
Advanced guard.

Advance Cavalry: One squadron with point and flanking patrols; communication maintained with independent cavalry. (Point of advance cavalry to point of advance party at least 4 or 5 miles).

Support: One regiment of infantry and mounted detachment of engineers. The support sends forward its advance party, one company, about 500 yards; the advance party is preceded from 300 to 500 yards by its point.

(About 1,000 yards.)

Reserve—in order of march: One battalion infantry; one battalion artillery; two battalions of infantry; one regiment infantry; company engineers (less detachment); ambulance company. (There may be a detachment of signal troops, though the division commander generally retains control of those troops).

(One to two miles.)
Main body.

Security for the Head of a Retreating Force: In retreat a column is preceded by a body of troops designated "leading troops," whose principal duty is to clear the road of obstacles and facilitate the withdrawal of the command. The strength and composition of such troops are determined by the situation. Engineers are generally necessary; cavalry is assigned to this duty to afford protection against guerillas or small hostile parties that may have succeeded in reaching the rear of the command. If the rear is seriously threatened, the leading troops march practically as an advanced guard.

The flanks of a column are protected in part by the advance guard, which carefully examines the ground on both sides of the line of march. It may be necessary, however, to provide additional security for a flank threatened by the enemy. This is done by sending a detachment, called a flank guard, to cover the exposed flank.

Flank guards vary in size from patrols to detachments of all arms. Their composition and formation depend upon the situation, though they are generally strong in cavalry on account of the necessity for rapid reconnaissance and communication. They may be composed exclusively of that arm, but when strong positions are to be held, or prolonged resistance to the enemy is expected, troops of all arms are necessary. Their duties are similar to those of an advance guard. They keep in constant touch with the column either by wire, signal, or messenger service.

When the main body executes a flank march near the enemy, the flank guard becomes a body of great importance. If the flank march is due to a considerable change of direction in the march of the column, it is generally advisable to convert the advance guard into a flank guard, and detail a new advance guard to precede the column. If the troops making the flank march start from camp, a separate flank guard will have to be provided.

In long columns the large units, such as regiments, will provide their own flank observation.

The rear guard is charged with the important duty of covering the retreat.

When a commander decides to retreat, he issues the necessary order. During a retreat the outpost for the night usually forms the rear guard of the following day.

The strength of a rear guard depends upon the nature of the country and the strength and character of the pursuing force. It cannot, like the advance guard, count on the support of the main body.

Machine guns are especially useful in the passage of defiles and in covering the crossings of rivers.

Engineers and ambulance companies are usually assigned to rear guards.

The troops of a rear guard are selected from those that have had previous local successes, or have suffered little loss and are comparatively fresh.

The rear guard should never miss an opportunity to deliver a strong counterattack. Not infrequently it is necessary to sacrifice a considerable portion of the troops in order that others may escape. Only by this method did Field Marshal French prevent the total destruction of his army on the retreat from Mons.

The character of the duties require of the rear guard commander much greater ability and judgment than those of the advance guard commander. The latter is always sure that friendly troops are approaching; the former knows that every delay made by him separates him still farther from possible reenforcement. It is for the rear guard commander to decide when he must retire without jeopardizing the safety of the troops whose retreat he is protecting. He must not retire before then, even if it means the sacrifice of all his force. He must not retire later than the psychological moment, otherwise he sacrifices his men uselessly.

The proximity and conduct of the enemy control, to a large extent, the formation of a rear guard. When it is not necessary to withdraw in deployed lines, the greater part of the rear guard marches on the road in column of route, taking up a formation resembling that of an advance guard faced to the rear. (See diagram opposite.) The distribution of troops is therefore similar to that of an advance guard, namely:

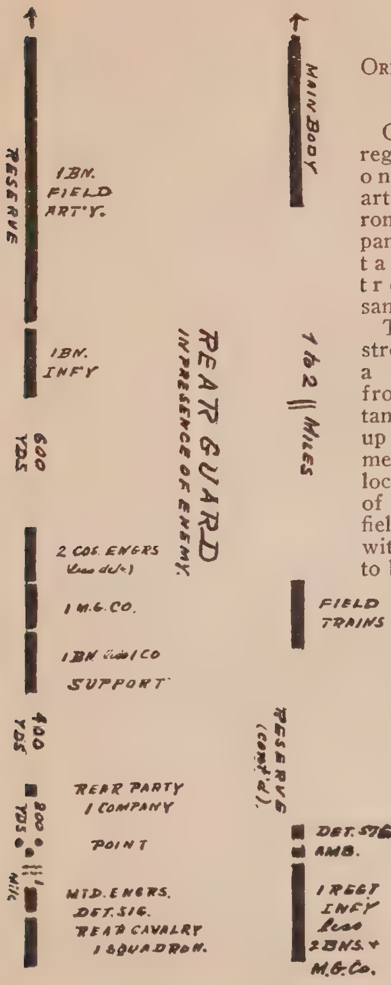
Reserve;
Support;
Rear cavalry.

The rear cavalry is that portion of the rear guard cavalry following the support. The sup-

ORDER OF MARCH OF A REAR GUARD

Composed of one regiment of infantry, one battalion field artillery, one squadron cavalry, two companies engineers, detachment signal troops, detachment sanitary train.

This represents a strong rear guard of a force retreating from an enemy. Distances are shortened up; a strong detachment of engineers is located near the rear of the guard; and field artillery is placed with the reserve so as to be near at hand for vigorous rear-guard actions intended to delay the enemy while the main body gets safely away to a selected position in rear. The engineers should be well supplied with demolition equipment to assist in delaying the advance of the enemy.



port, as in an advance guard, is divided into two parts; that part nearest the enemy is called the rear party and marches with a rear point. Mounted engineers usually accompany the support and may be attached to the rear party. Where the cavalry is of sufficient strength and has horse artillery attached, the entire rear guard, excepting the reserve, may be composed of that arm. The reserve is composed mainly of infantry and artillery.

The distances of the rear guard from the main body and between the fractions of the rear guard are about the same as in the case of an advance guard. If marching at night, the rear guard draws nearer the main body.

If there is a possibility that the rear of the column may be attacked, a rear guard of suitable strength and composition is provided. If the hostile attempts are confined to guerillas, marauders, etc., the guard should be strong in cavalry. Its conduct is practically the same as that of the rear guard of a retreating force. It generally marches in rear of the trains, those organizations following the combatant troops without distance.

Outposts in Maneuver Warfare

The following discussion of outposts should be understood to refer only to those established for the protection of armies maneuvering in the field. Whereas in general they conform to the means provided for the protection of intrenched troops, in detail they are entirely different. The security of intrenched lines has been discussed on page *72 et seq.*

The size and disposition of the outpost will depend upon many circumstances, such as the size of the whole command, the proximity of the enemy and the situation with respect to him, the nature of the terrain, etc.

A suitable strength may vary from a very small fraction to one-third of the whole force. For a single company in bivouac a few sentinels and patrols will suffice; for a large command a more elaborate outpost system must be provided. It should be no stronger than is consistent with reasonable security.

The most economical protection is furnished by keeping close contact, with the enemy by means of outpost patrols, in conjunction with resisting detachments on the avenues of approach.

The outpost should be composed of complete organizations.

In a brigade or smaller force on the march toward the enemy, the outpost is generally formed from the advance guard, and is relieved the following day when the new advance guard crosses the line of outguards. In a retreat, the detail for outpost duty is generally made from the main body. The new outpost becomes the rear guard the following day.

When, as in large forces, an advance and rear guard performs such duty for several days, the outpost, during this period, is furnished by the advance or rear guards.

When the command is small and stationary for several days, the outpost is relieved daily. In large commands, the outpost will, as a rule, be relieved at intervals of several days.

The positions held by the subdivisions of the outpost should generally be prepared for defense, but conditions may render this unnecessary.

Troops on outpost keep concealed as much as is consistent with the proper performance of their duties; especially do they avoid appearing on the sky line.

A mixed outpost is composed principally of infantry. The infantry is charged with the duty of local observation, especially at night, and with resisting the enemy long enough for the main body to prepare for action. The cavalry is charged with the duty of reconnaissance, and is very useful in open country during the day.

If the infantry has been severely taxed by marching or fighting, a large part of the outpost may be temporarily formed of cavalry.

When an outpost is detailed from the advance guard, the advance cavalry of the advance guard becomes the advance cavalry of the outpost and continues the work of reconnaissance until recalled for the night.

Artillery is useful to outposts when its fire can sweep defiles or large open spaces and when it commands positions that might be occupied by hostile artillery. The guns are carefully concealed or protected and are usually withdrawn at night.

Machine guns are useful to command approaches and check sudden advances of the enemy.

Engineers are usually attached to an outpost to assist in constructing intrenchments, clearing the field of fire, and opening communications laterally and to the rear.

The supreme commander generally retains control of the signal troops and establishes a line of information to the reserve and from the reserve to each support and important detached post.

It is generally unnecessary to attach any portion of the sanitary train to an outpost, as the equipment of the regimental aid station carried in the sanitary combat train will as a rule be sufficient. If necessary, dressing stations may be established by ambulance companies of the sanitary train in convenient location to the rear of the outpost line.

The field trains of troops on outpost duty generally join their organizations; if an engagement is probable, they may be held in rear.

The outpost will generally be divided into four parts. These, in order from the main body, are the reserve, the line of supports, the line of outguards, and the advance cavalry.

The distances separating these parts, and their distance from the main body, will depend upon the object sought, the nature of the terrain, and the size of the command. There can be no uniformity in the distance between supports and reserve, nor between outguards and supports, even in the same outpost. The avenues of approach and the important features of the terrain will largely control their exact positions.

The outpost of a small force should ordinarily hold the enemy beyond effective rifle range of the main body until the latter can deploy. For the same purpose the outpost of a large force should hold the enemy beyond artillery range.

The reserve constitutes the main body of the outpost and is held at some central point from which it can readily support the troops in front or hold a rallying position on which they may retire. The reserve may be omitted when the outpost consists of less than two companies.

The reserve may comprise one-fourth to two-thirds of the strength of the outpost.

The supports constitute a line of supporting and resisting detachments, varying in size from a half company to a battalion. They furnish the line of outguards.

The supports are numbered consecutively from right to left. They are placed at the more important points on the outpost line, usually in the line on which resistance is to be made in case of attack.

As a general rule, roads exercise the greatest influence on the location of supports, and a support will generally be placed on or near a road The section which it is to cover should be clearly defined by means of tangible lines on the ground and should be such that the support is centrally located therein.

The outguards constitute the line of small detachments farthest to the front and nearest to the enemy. For convenience they are classified as pickets, sentry squads, and cossack posts. They are numbered consecutively from right to left in each support.

A picket is a group consisting of two or more squads, ordinarily not exceeding half a company, posted in the line of outguards to cover a given sector. It furnishes patrols and one or more sentinels, double sentinels, sentry squads, or cossack posts for observation.

Pickets are placed at the more important points in the line of outguards, such as road forks. The strength of each depends upon the number of small groups required to observe properly its sector.

A sentry squad is a squad posted in observation at an indicated point. It posts a double sentinel in observation, the remaining men resting near by and furnishing the reliefs of sentinels. In some cases it may be required to furnish a patrol.

A Cossack post consists of four men. It is an observation group similar to a sentry squad, but employs a single sentinel.

At night it will sometimes be advisable to place some of the outguards or their sentinels in a position different from that which they occupy in the daytime. In such case the ground should be carefully studied before dark and the change made at dusk. However, a change in the position of the outguard will be exceptional.

Sentinels are generally used singly in daytime, but at night double sentinels will be required in most cases. Sentinels furnished by Cossack posts or sentry squads are kept near their group. Those furnished by pickets may be as far as 100 yards away.

Every sentinel should be able to communicate readily with the body to which he belongs.

Sentinel posts are numbered consecutively from right to left in each outguard. Sentry squads and Cossack posts furnished by pickets are counted as sentinel posts.

By day, cavalry reconnoiters in advance of the line of observation. If there is independent cavalry in front, the advance cavalry maintains connection therewith and reconnoiters only where necessary. At night, however, that the horses may have needed rest and because the work can be better done by infantry, the greater part of the cavalry is usually withdrawn in rear of the supports, generally joining the reserve, small detachments being assigned to the supports for patrolling at a distance.

With efficient cavalry in front, the work of the infantry on the line of observation is reduced to a minimum.

General instructions for the advance cavalry are given by the outpost commander, but details are left to the subordinate.

Instead of using outguards along the entire front of observation, part of this front may be covered by patrols only. These should be used to cover such sections of the front as can be crossed by the enemy only with difficulty and over which he is not likely to attempt a crossing after dark.

In daylight much of the local patrolling may be dispensed with if the country can be seen from the posts of the sentinels. However, patrols should frequently be pushed well to the front unless the ground in that direction is exceptionally open.

Patrols or sentinels must be the first troops which the enemy meets, and each body in rear must have time to prepare for the blow. These bodies cause as much delay as possible without sacrificing themselves, and gradually retire to the line where the outpost is to make its resistance.

Patrols must be used to keep up connection between the parts of the outpost except when, during daylight, certain fractions or groups are mutually visible. After dark this connection must be maintained throughout the outpost except where the larger subdivisions are provided with wire communication.

In addition to ordinary outguards, the outpost commander may detail from the reserve one or more detached posts to cover roads or areas not in the general line assigned to the supports.

In like manner the commander of the whole force may order detached posts to be sent from the main body to cover important roads or localities not included in the outpost line.

The number and strength of the detached posts are reduced to the absolute needs of the situation.

The outpost is posted as quickly as possible, so that the troops can the sooner obtain rest. Until the leading outpost troops are able to assume their duties, temporary protection, known as the march outpost, is furnished by the nearest available troops.

The halt order of the commander, besides giving the necessary information and assigning camp sites to the parts of the command, details the troops to constitute the outpost, assigns a commander therefor, designates the general line to be occupied, and, when practicable, points out the position to be held in case of attack.

The outpost commander, upon receipt of this order, should issue the outpost order with the least practicable delay. In large commands it may often be necessary to give the order from the map, but usually the outpost commander will have to make some preliminary reconnaissance, unless he has an accurate and detailed map.

The reserve is marched to its post by its commander, who then sends out such detachments as have been ordered and places the rest in camp or bivouac, over which at least one sentinel should be posted. Connection must be maintained with the main body, the supports, and near-by detached posts.

The supports march to their posts, using the necessary covering detachments when in advance of the march outpost. A support commander's order should fully explain the situation to subordinates, or to the entire command, if it be small. It should detail the troops for the different outguard and, when necessary, define the sector each is to cover. It should provide the necessary sentinels at the post of the support, the patrols to be sent therefrom, and should arrange for the necessary intrenching. Connection should be maintained with the adjoining supports and with the outguards furnished by the support.

Each outguard is marched by its commander to its assigned station, and especially in the case of a picket, is covered by the necessary patrolling to prevent surprise.

Having reached the position, the commander explains the situation to his men and establishes reliefs for each sentinel, and, if possible, for each patrol to be furnished. Besides these sentinels and patrols, a picket must have a sentinel at its post.

The commander then posts the sentinels and points out to them the principal features, such as towns, roads, and streams, and gives their names. He gives the direction and location of the enemy, if known, and of adjoining parts of the outpost.

He gives to patrols the same information and the necessary orders as to their routes and the frequency with which the same shall be covered.

Each patrol should go over its route once before dark.

Every picket should maintain connection by patrols with outguards on its right and left. Each commander will take precaution to conceal his outguard and will generally strengthen his position by intrenching.

Evening and shortly before dawn are hours of special danger. The enemy may attack late in the day in order to establish himself on captured ground by intrenching during the night; or he may send forward troops under cover of darkness in order to make a strong attack at early dawn. Special precaution is therefore taken at those hours by holding the outpost in readiness, and by sending patrols in advance of the line of observation. If a new outpost is to be established in the morning, it should arrive at the outpost position at daybreak, thus doubling the outpost strength at that hour.

An examining post is a small detachment, under the command of an officer or a noncommissioned officer, stationed at some convenient point to examine strangers and to receive bearers of flags of truce brought in by the outguards or patrols.

ORDER OF MARCH

The diagrams on pages 81 and 89 are intended to illustrate the itinerary or time table of the march of a reenforced brigade preceded by a small body of advance cavalry.

The horizontal scale represents "time"—one hour equal to one inch, and one-tenth inch equal to six minutes. The vertical scale represents "distance," and one inch is equal to two miles.

The order of march is—

Advance cavalry.
Advance guard.
Main body.

The brigade is assumed to consist of three regiments of infantry, one squadron of cavalry, one battalion of field artillery, one battalion of engineers, one company signal troops, one ambulance company, and the regulation field trains, but no part of the division trains. The latter are assumed to be with the division to which this brigade belongs. For instance, this brigade may be simply marching on a road parallel to the remainder of its division.

The advance cavalry consists of the whole squadron of cavalry, and a detachment of signal troops as one radio section on pack mules.

The advance guard consists of one regiment of infantry, one company of engineers, a detachment of signal troops and is arranged as follows:

Infantry point.
(300 yards.)

Advance party.
One company less the point.
(500 yards.)

Support.
One battalion less one company.
Detachment of engineers.
Detachment of signal troops.
(1,000 yards.)

Reserve.
One regiment less one battalion.
One company engineers less detachment.
Detachment of ambulance company.
(One mile.)

Main body.
(Consisting of the remainder of the brigade.)
One regiment of infantry.
One battalion of field artillery.
One regiment of infantry.
One battalion of engineers less one company.
One company signal troops less detachments.
One ambulance company less detachment.
Field trains.

The lengths of columns in marching formation with the usual arrangements for security and reconnaissance will be roughly:

Advance cavalry, ½ mile.
Infantry column, 5 1/3 miles.
Advance guard alone, 1 2/3 miles.

The rate of march of cavalry is taken at five miles per hour, of infantry and the accompanying artillery and mounted men at two miles per hour. These rates include the usual small halts for rest of from five or ten minutes in each hour. Suppose that the advance cavalry is ordered to clear Kane Creek at 7 o'clock in the morning, to halt about one hour at Mason's Farm for the purpose of setting up and testing by communication with the rear of the infantry column their wireless apparatus, and to camp for the night at Watson's Mill. Let us see what the diagram shows in regard to this body of troops. The steeply inclined line shows the rate of march, five miles per hour, the tail of the column crossed Kane Creek at 7 o'clock, and therefore, left camp, two miles to the rear, at twenty-four minutes before seven or 6.36 a. m.; the cavalry column is about half a mile long, equal to six minutes in marching time, so the cavalry must start from camp at exactly 6.30 a. m. The head of the cavalry column reaches Mason's Farm at 8.30, halts for an hour and continues on to camp, where it arrives about 11 a. m.

The infantry column follows immediately after the cavalry, but, marching at a slower rate, continually falls behind. The advance guard clears Kane Creek about 8.25 a. m. The tail of the main column does not get out of camp until about 9.15 a. m.

The diagram shows the relative position of the several bodies at any hour.

The advance guard reaches Moore's shortly after 1.30 p. m. and goes into camp. The main body camps a little in rear at Roswell Cross Roads, but does not get there until 2:30 p. m.

VII

Offensive in Maneuver Campaign

The location and disposition of troops in the theater of operations before they come within striking distance of the enemy will be the result of the strategical combinations of the commander, and upon his skill will depend the favorable or unfavorable disposition of his forces relative to those of the enemy.

Rumania, in her campaign of the autumn of 1916, apparently committed a serious strategical error in sweeping her armies into Transylvania, instead of going after the Bulgarian army on her southeastern frontier. She left there behind her the nucleus of a hostile force which grew in strength and efficiency, and which when Bulgaria declared war promptly struck in the Dobrudja under Mackensen's command at the moment when Rumania found the bulk of her available forces far across the Transylvanian border. Another Teutonic army under Von Falkenhayn was able, from its favorable position north of the Maros River, to press toward the passes of the Wallachian frontier and to hammer and drive the Rumanians from the front while Mackensen threatened their capital from the east and south.

Offensive in Maneuver Campaign

Captain Forsyth-Major in a recent excellent volume on the Elements of Tactics says:

> Wars are not won by sweeping over the enemy's country. The mere occupation of territory, the seizure of this or that position, the overrunning of provinces, may have a useful purpose, but these are not the decisive factors.
>
> What counts is the dispersion, disarmament, and capture of the enemy's fighting force or its reduction to such a state that resisting power has gone out of it. The aim is a great and combined effort to encounter and destroy the fighting force of the enemy.

Strategy having brought the opposing forces near enough for probable combat, the tactical formation of the troops on the field of battle, the use of weapons, and the employment of the combined arms, in short, the principles of combat, become matters of the highest importance. The principles laid down are based on experience.

There are two general classes of combat, the offensive and the defensive.

The defensive may make use of the purely passive defense or the temporary defense which contemplates the gaining of time and the assumption of the offensive at the first favorable opportunity.

All experience emphasizes the fact that decisive success in combat can be obtained only by a vigorous offensive.

Combat Principles: The following principles apply to both offensive and defensive combat:

One of the first principles of modern war is that subordinate officers must act on their own initiative if occasion arises without waiting for detailed orders, and they must therefore understand the general principles that guide the commanders of armies.

The full field power of an army cannot be exerted unless all its parts act in close combination, and this cooperation is possible only if each arm understands the characteristics of the other arms.

Fire superiority of both infantry and artillery is necessary to success, and if properly utilized and followed up will insure success.

Unity of command is essential. The regiment united in combat has greater force and fighting power than have three separate battalions. A battalion acting as a unit is stronger than are four companies acting independently. All the troops assigned to the execution of a distinct tactical task must be placed under one command.

The task assigned any unit must not involve a complicated maneuver. Simple and direct plans and methods are productive of the best results in warfare.

All the troops that are necessary to execute a definite task must be assigned to it from the beginning. Avoid putting troops into action in driblets.

Detachments during combat are justifiable only when the execution of the tasks assigned them contributes directly to success in the main battle or when they keep a force of the enemy larger than themselves out of the main battle. When combat is imminent all troops must be called to the probable field of battle. A force is never so strong that it can needlessly dispense with the support of any of its parts during combat.

Too many troops must not, however, be committed to the action in the early stages, no matter what be the nature of the deployment or the extent of line held. Some reserves must be kept in hand.

Use the reserve only when needed or when a favorable opportunity for its use presents itself. Keep some reserve as long as practicable, but every man that can be used to advantage must participate in the decisive stage of the combat.

Flanks must be protected either by reserves, fortifications, or the terrain.

Flank protection is the duty of the commanders of all flank units down to the lowest, whether specifically enjoined in orders or not. This applies to units on both sides of gaps that may exist in the combat lines.

Reconnaissance continues throughout the action.

Use of the Combined Arms: The infantry is the principal and most important arm, which is charged with the main work on the field of battle and decides the final issue of combat. The rôle of the infantry, whether offensive or defensive, is the rôle of the entire force, and the utilization of that arm gives the entire battle its character. The success of the infantry is essential to the success of the combined arms.

The artillery is the close supporting arm of the infantry and its duties are inseparably connected with those of the infantry. Its targets are those units of the enemy which, from the infantry point of view, are most dangerous to its infantry or that hinder infantry success. The greater the difficulties of the infantry the more powerful must be the artillery support.

In order to insure close cooperation of the artillery with the infantry in combat, the leader of each infantry unit to which artillery support has been assigned will, in both the attack and defense, make known to the artillery commander his plans and their expected development and will, throughout the action, keep the artillery representative accompanying him fully informed of the needs of the infantry in the matter of artillery support.

The security of the artillery in combat must be provided for either by the distribution of the other arms or specifically in orders. But when such is not the case the necessary protection must be afforded by the nearest unit of infantry or cavalry whose mission will permit it to give such protection.

Artillery may to a certain extent provide for its own security by means of machine guns carried on the limbers and operated by a detail of the cannoneers when occasion requires.

The cavalry, preceding contact of the opposing troops of the other arms, is engaged in reconnaissance of the enemy and of the terrain and in accomplishing such mission as may be assigned it. During combat it directs its activities to the support of the other arms and particularly toward insuring the success of the infantry as soon as that arm is fully committed to action. It must not be given a task, nor voluntarily assume one, that will prevent its fullest cooperation with the other arms in the decisive action. The cavalry leader will be given wide initiative in the tactical employment of his command during the decisive combat.

The cavalry of an army corps is divided into two classes, that attached to the infantry divisions and called divisional cavalry, and that forming a separate strategical unit called the cavalry division.

The divisional cavalry is an auxiliary arm of the infantry division and is used as the division commander directs, either as independent cavalry or as advance cavalry.

The cavalry division is pushed, as independent cavalry, far to the front, often several days' march in advance of the remainder of the army corps, to drive back the covering forces of the enemy and to gain accurate information of his dispositions, strength, and movements. This is the most valuable use of the cavalry division in the opening stages of a campaign. The use of the cavalry division as a screen is justified only in exceptional cases, as it is seldom effective in absolutely preventing hostile reconnaissance. Better results can be obtained by using the cavalry as a mass to engage and defeat the enemy's cavalry. The troop leading of the cavalry division is prescribed in the drill regulations for that arm.

An army corps commander may find it necessary to strengthen the independent cavalry of the army corps by the temporary assignment to it of all or part of the divisional cavalry.

An army commander may combine two or more cavalry divisions under one leader.

The engineer troops, when not engaged in the special duties of their arm, may be used as infantry, but only in exceptional cases, as part of the attacking line. On the offensive, when used as infantry they form part of the reserve, part of a holding force, or are used for flank protection. On the defensive, they may be used as infantry wherever the development of the action warrants such use.

The duties of all other special troops or units that form part of the division are laid down in the different tactical manuals.

Heavy Field Artillery: Experience in the present European War indicates the increased importance of heavy field artillery, both guns and howitzers. The long ranges of these heavy pieces and the destructive effects of their projectiles have proved of the greatest importance and an increase in this type of artillery is certain to be one of the important results of the war. The best combination seems to be batteries of low-power, small-caliber, rapid-fire field pieces reenforced by a considerable number of heavier howitzers and field guns for use in combating the ordinary field pieces of the enemy as well as his field intrenchments, and for long-range firing when necessary.

Before the present war started most of our artillery officers believed that the heaviest field gun or howitzer which would be needed by an army was the 6-inch howitzer firing a 120-pound projectile, and in justice to them it must be stated that, with the exception of the German and Austrian armies, this belief was general. They believed also that the function of the heavy field guns of more than 6-inch caliber, which it was known Germany and Austria possessed, was to destroy field forts of steel and concrete, and that it would not be possible to transport either of these guns or the ammunition they required with the field armies. How wrong this assumption was is shown by the present war in which the Germans and Austrians have actually transported with their field armies 11-inch howitzers, 12-inch howitzers, 16-inch howitzers, and 17.7-inch howitzers and used them, not for the purpose of destroying works of steel and concrete, but for the purpose of destroying field fortifications, supply depots in rear of the line, villages in which troops are quartered, wire entanglements and other obstacles. All reports now indicate that the great successes obtained by the German and Austrian armies on the eastern front were due in no small measure to the use of these enormous field pieces, which must hereafter be considered as essential to success in war.

The largest calibers are the most effective and have done the work in this war with high-explosive shell.

The large caliber mortars and howitzers with high-explosive shell are employed not only to reduce concrete forts, but also against field works and intrenchments of all kinds.

The Germans had 42-cm. (16.5-inch) mortars, 28-cm. (11.023-inch) Krupp siege howitzers, and 21-cm. (8.4-inch) howitzers at the outbreak of war. These mortars and howitzers were employed in the reduction of the Belgian fortifications.

The 42-cm. (16.5-inch) mortars are transported by rail, and spur tracks are run directly to the edge of the pits in which they are emplaced. It is probable that a derrick car is used to mount the parts of the carriage and the mortar and also to handle the shell, which weighs about 2,000 pounds.

The limited mobility of heavy field artillery renders its use inadvisable in any position from which the conditions of combat may require its hasty withdrawal. For that reason it has no place in an advance guard; in an outpost, unless occupying a position in which the action is to be fought to a decision; in advanced positions or posts; in the rencontre; or in delaying actions, unless its loss is justifiable.

On the offensive, heavy field artillery finds its function in firing upon supporting points in the hostile line; upon covered positions occupied by large bodies of the enemy, particularly his reserves; in the destruction of material objects, as buildings, bridges, etc.; and, in general, against a position that has been deliberately taken up and strengthened by the enemy, including the destruction of wire entanglements, parapets, and shelters.

On the defensive, heavy field artillery finds its use in compelling the deployment of the enemy's columns at long distances from the defensive line, against any large formed bodies of the enemy, and against those parts of his matériel or material objects within his lines that offer an important target.

Due to its long range, it is profitably used in both offensive and defensive combat in restricting the field of activity of the enemy's shorter range artillery, and this is a most important function. It can be used to advantage also in the destruction of the enemy's field artillery matériel.

The use of the heavier types of field artillery presupposes an offensive, where reconnaissance of the enemy's position has been thorough and where the attack has been carefully planned; or a defensive, where there has been time to select and strengthen a position deliberately. Until the use of the heavier field artillery under the conditions given can be clearly foreseen, its position is well to the rear of all the combatant units.

Keeping in mind the peculiar conditions in the present theater of operations of western Europe, we may indicate the following tendencies in the use of field artillery: A greater expenditure of shrapnel in proportion to shell; longer ranges; the recognition of the necessity for perfect coordination between infantry and field artillery, and the adoption of methods of training and instruction in time of peace with this end in view; concealment of batteries from aerial observation; more general use than before of indirect fire and masking of batteries behind crests (although this principle was clearly recognized before the European War); close cooperation between airplanes and artillery; use of advanced observers, even in the infantry trenches, with consequent necessity for greater perfection in the systems of communication.

Aircraft in Combat: Aircraft as now developed are of four classes: First, high-speed scouting machines; second, heavy battle machines; third, reconnaissance airplanes, used also for control of artillery fire; fourth, dirigibles. In general the first three work in cooperation. That is, first the speed machines reconnoiter to the front; they are followed by the battle machines, which in their turn clear the way for the reconnaissance airplanes; those assigned to the artillery stay right with their guns. Fortresses and harbor-defense works and naval formations require special organizations of airplanes, some or all of which may be operated from the water. The organization, kind, and number of the machines and personnel required for this particular service depend on the special locality and mission of whatever formation the aircraft are to be attached to.

The use of airplanes is gradually being developed from experience in the European War. Organization has been found to be one of the most important considerations; in general the organization has been into squadrons. The squadron is a tactical and administrative unit. It has a personnel consisting of pilots, observers, bomb droppers, mechanicians, chauffeurs, and drivers. Flying personnel has to be developed in the military service. Unlike chauffeurs, for instance, there are few in the civil population who can be drawn on. The few who fly are demonstrators, exhibition flyers, or sportsmen. They are limited in number and scarcely a military asset. In France the squadrons usually have six machines and two spares. They have the same organization of depots of resupply that other units of the armies possess. The squadrons usually consist of complete units of one kind of machine; that is, speed, reconnaissance, or fighting. These squadrons are usually assigned to an army, or more if the machines and personnel are available.

In general an airplane requires for its operation a personnel of one pilot, one observer, and two enlisted men, mechanicians, chauffeurs, etc.

In England twelve machines of different classes are assigned to a squadron.

Aircraft and Artillery: Airplanes are now an indispensable adjunct to artillery. Due to the concealment practiced in the emplacement of field artillery, it is impossible to determine the location of a position from the ground and very difficult from overhead. The duties of airplanes attached to the artillery are:

1. General reconnaissance;
2. To discover batteries of the enemy;
3. To test the concealment of their own guns;
4. To observe and direct the artillery fire on the enemy's batteries and trenches.

Communication is provided by means of visual signals or by radiotelegraphy.

Artillery insufficiently provided with airplanes is seriously at a disadvantage in comparison with an enemy who is well provided.

Observation captive balloons are also employed for the service of the artillery.

Officers who conduct the fire of guns are well up in the trenches, connected with their guns or batteries by telephone wires, which are usually run along the walls of the communication trenches and held in place by staples. In addition to the observation posts in the advance trenches there is another method employed during the day; it is the Drachen, or sausage-shaped captive balloon which is sent up at daylight and remains all day until dark, at altitudes varying from four to eight hundred yards, and far enough in rear of the lines to escape artillery fire, if directed against it. The observer in this balloon is equipped with telephonic communication and powerful glasses.

For this important artillery service among other reasons, attempts to gain "control of the air" are made by belligerents at the beginning of hostilities. This effort takes the form of offensive action by airplane against airplane. For this purpose machines known as "speed scouts" and "battle airplanes" have been developed. All the great European nations are now equipped with them. The only way in which enemy airplanes can be effectively dealt with is by airplanes, because they are difficult targets for gun fire from the ground. To gain control of the air a great preponderance in number and efficiency of aircraft is necessary. So far in the European War, unless one side had a greatly preponderating number and quality of airplanes, they have been unable to obtain and keep control of the air.

For bomb attacks on any locality these machines are sent in flotillas of from thirty to sixty machines, each of which is provided with from five to ten bombs. They go to the locality and circle over it, dropping their projectiles. Against railways, roads, bridges, and hostile parks of various kinds, this method of attack has given considerable success.

Antiaircraft Artillery: The function of antiaircraft guns is to destroy the airplanes or airships or to prevent them from flying low enough to make reconnaissance. At the beginning of the war aviators felt safe at an altitude of 8,000 feet; now they are in danger at 10,000, and this greater height makes reconnaissance more difficult.

The antiaircraft gun must be quick firing, of high velocity, adapted for rapid loading at high elevations, easy to sight and fire. The method of fire must be by "trial and error." For defense against airplanes making tactical reconnaissance within the fighting areas a percussion shell of 1½ to 2 pounds weight, containing a day tracer if practicable, has been found to give the best service. For airplanes engaged on strategical reconnaissance in rear of the lines the same kind of gun is suitable, but a heavier gun firing shrapnel, with arrangements for more careful and accurate firing and for the observation of fire, may be used. These guns should be on more or less mobile mounts depending on the service expected of them.

For defense against bomb-dropping raids on depots, docks, bases, etc., the antiaircraft guns should be on fixed mountings with all practicable devices for accurate observed fire. Separate guns for airships and airplanes should be provided, a larger gun about 3-inch caliber being required for dirigibles like the Zeppelins. High-explosive shell with the most sensitive fuzes should be used as long as friendly objects are not endangered by them.

Machine Guns: Prior to the invasion of France it was generally held that the machine gun was a weapon of opportunity and its use would be confined almost entirely to the defensive. It was believed also too valuable and too few in number to be risked unduly, and the English soldiers, especially, were instructed not to risk their machine guns but to retire when in danger of being cut off.

In this, as in other matters of organization, the Germans were in advance of the world. Their machine guns were largely those of the water-cooled type. Nevertheless they carried them with the leading troops in advance and used them on the firing line in open attacks. They employed their machine guns as they did their artillery and their personnel, the theory being that, where success was necessary to accomplish the mission, there could be no sacrifice in men and material too great. Both on the advance and retreat from the Marne machine guns vied with artillery in being the first to engage and the last to leave the field.

Those who have taken part in the trench warfare in Europe appear, many of them, to have lost sense of proportion. There was recently (March, 1917) a statement from a very able English officer that the small arms rifle was an obsolete weapon and that hereafter infantry troops would be armed with machine guns, hand grenades and spears. It was evident that he had forgotten that maneuvering in the open field was certain to be characteristic of the opening of all wars as well as the closing of those wars fought to the finish. Undoubtedly the number of machine guns will increase and no infantry company will be without them; ammunition service is the limiting element. It is probable that the machine guns generally will be grouped in an organization under the immediate direction of the generals of division. This will enable them to throw a preponderating fire effect on any part of the line in an attack and to reenforce effectively any portion of the line seriously threatened in the defense. The machine guns will probably be organized so as to permit the detachment of tactical units, of a size proportionate, for service with independent brigades and regiments acting alone.

Frontage of Units in Combat, Maneuver Campaigns: Depth in formation for combat, rather then extension of front, is all important in the initial deployment, even where the position and the strength of the enemy have been fully developed. Sufficient depth makes available means to meet the contingencies of combat and the unforeseen developments in the situation as they arise. Troops once deployed and committed to action are no longer available to enable the leader to exercise a constant influence over the course of the entire combat. The progress of the combat will call for an extension of the front occupied in the initial deployment that cannot be foreseen.

Troops must be held available for the purpose of such extension. For that reason some reserves must be held to the last, but when the decisive moment arises every man that can be used to advantage must be put into the action.

Frontages for deployment are based upon the infantry strength of the division and higher units. Artillery has no place in the front line of the initial deployment and, at the time such deployment is made, the place of the cavalry is out in front of the line or in contact with the enemy on the flanks. The infantry strength alone, therefore, is considered in fixing the frontages for the initial deployment.

The frontages occupied by the different battle units are not in proportion to the number of their component units. The duration of the combat and the needs for the security of the flanks increase with the size of the force employed. Each higher leader must keep out a reserve. A division, therefore, makes its initial deployment on a front only twice that justified for the brigade, and a field army of three divisions, when one division is held as a reserve, is assigned for deployment a front twice that of the division.

A unit whose flanks are secured by other troops or by impassable obstacles, or one that occupies a position naturally strong, or made so by adequate preparation, may be given a frontage limited only by the requirement of fire efficiency throughout the combat. The same is true of reserves deployed to bring about a decision already prepared by other troops. A force whose flanks are exposed must protect them by a maximum distribution in depth.

Frontages of units in forces no larger than a brigade are prescribed in the drill regulations for the different arms, and the principles upon which the frontages given are based apply when such units are part of a larger force than a brigade.

Our Infantry Drill Regulations allow 800 yards for a regiment of 1,500 men forming part of a line of defense.

With the new organization of 1,793 rifles per regiment, the same disposition would cover about 900 yards of frontage.

The above figures, which show a density of practically two rifles per yard, are theoretical and are based on a *uniform* field of attack. Ordinarily the ground over which the attacker must advance is broken and varied along the entire front; in some places natural obstacles make approach impossible, at others approach to close range, 600 yards, can be made with little loss; at still others the attacker will be under the defender's rifle fire from extreme range.

Recent wars furnish characteristic illustrations in this line. The official reports of the Manchurian war indicates, for instance, that in concealed marches in growing grain the infantry could advance to within 400 meters of the enemy without firing, but when the crops were cut fire was opened on both sides at a great distance. During the attack of the Third Division at Nankvantoun fire was opened at 1,200 meters; at several other engagements extreme ranges of 1,000 and 1,200 meters are reported.

It is evident that the assailant opened fire only after having been forced to do so by the defenders.

In other cases it happened on the contrary that the defense reserved his fire until the enemy came within short range in order to produce a sudden and unexpected effect at 500 or 600 meters. This fire was so effective that attacks made, starting from cover and by as many as six successive lines, were repulsed.

It is noted that defenders are apt to fire too high at ranges less than 500 meters.

Divisions and Army Corps: A division, when operating against an enemy of nearly equal training and morale, and on *open and unprepared ground,* cannot make its initial deployment on a front greater than two to three miles and, at the same time, have the capacity to hold its position strongly throughout the action. In the same way a field army of three divisions would be limited in its initial deployment to the frontage of five to seven miles. Where, for uncontrollable reasons, deployment over a more extended front is necessary, strong reserves are the only means available to meet the dangers incident to such overextension.

The normal arrangement of a division forced to take up a *defensive position* in maneuver campaign would be one brigade in the general reserve and one regiment from each of the other two brigades in the reserve of its brigade section. Out of the nine regiments of the division only four therefore will be on the firing line. The frontage guarded by each of these four regiments will be normally about 1,800 yards, or for the division about 7,200 yards, a little over four miles.

There are 16,176 infantry rifles in a division. The density therefore in what has been designated above as the normal or average distribution would be 2¼ infantrymen per yard, or 3,960 per mile. Counting all the combatants in a division, namely about 25,000, the density would be nearly 3½ men per yard or 6,160 per mile.

At the battle of Mons in August, 1914, the British force of 70,000 was holding a line twenty-five miles long—less than 3,000 per mile; and later at Ypres in October, one British division of 12,000 men is reported as holding a line of eight miles against three German corps. This goes to show that the distribution and the length of line held is not regulated by rule, but by the work devolving on the command.

In the trenches now held by the Germans on their western front, one of our military observers reports that a section of the line 1,000 meters long was held by a regiment of 3,000 men, with one battalion and ten machine guns in the trenches and two battalions in reserve. Two companies were assigned to the actual trenches, one-third constantly on duty therein and the other two-thirds at work or resting just behind the crest of the ridge in huts built by themselves from logs out of the adjoining forest.

The judgment of the commander will determine the strength required in each of the larger sections of the line, increasing the density in some places and diminishing it in others until a fair balance is reached.

Every defensive line, whether encircling some position or fully extended along the front of an army, should, as a rule, be divided into independent sections each of a size suited to the command by one man. In this way tactical units, with their supports, reserves, and supply units, may be kept together, affording not only better control, but making easier the task of supply and administration.

In the line of supporting points with their flanking trenches we may expect to find a certain section occupied by a battalion. Of this unit one or two companies may form the supports, and of the remaining two companies one-half, perhaps, will be assigned to actual duty in the trenches and patrol duty or duty at listening posts in front, the remainder being held in a concealed place in rear. When an attack is imminent the front line should be strengthened by the latter and when the attack is delivered the supports should also be in the firing trenches if the situation permits.

Intrenchments: On the defensive the artificial strengthening of the position taken up is limited only by the time and the facilities available. On the offensive intrenchments are used on all lines that are to be held for any length of time. Troops advancing to the attack must understand that once the assault is initiated the best protection against losses is afforded by an uninterrupted and vigorous advance toward the enemy's position, and by the use of such natural cover as the ground offers. In the attack intrenchments will be used only when further advance is for some time impossible, and to hold ground already gained.

Post of the Leader: On the march when there is a probability of contact with the enemy, the leader of each column is at the front, usually well forward with the advance guard. During action, in forces no larger than a brigade, the leader places himself far enough to the front to direct personally the movements of his command. In divisions, it will, at times, be possible to find a point of observation from which the division commander can supervise the course of the action or, at least, overlook the most important part of the field assigned to his division. In forces not larger than a division, the post of the leader during combat is usually near the position of the reserve. In forces larger than the division, and in the division where the terrain does not permit of personal observation, it is best for the leader, during the action, to be well in rear, removed as far as possible from the sights and sounds of the battle field, in order that his decisions may not be unduly influenced by local conditions. In this case communication with all parts of the battle field must be direct, rapid, and continuous.

Reserves: The preponderating influence of rifle and machine gun fire in deciding an action seems to call for the deployment in the early stages of all the troops that can be used on the firing line. But rifle fire, even with the maximum possible support of artillery fire, will not alone force a favorable decision. Infantry, properly trained and properly led, cannot be driven from position by fire action alone. For that purpose an assault actually delivered, or one that shows a determination to close with the enemy, is necessary. The firing line prepares the way for this assault, but is not in itself sufficient for its completion. Fresh troops must be at hand to give the firing line the impetus necessary to drive it forward, and fresh troops must be at hand actually to penetrate the enemy's position, to fill in gaps that develop in the line, to cover the reorganization of troops disorganized in the assault, and to meet the counterattacks. On the defensive, troops must be at hand to meet the play of the opponent who holds the initiative. In both offensive and defensive combat, flanks that are vulnerable must be secured. For all such purposes some troops must be kept out of the firing line until the very last stages of the action. Reserves are thus a necessity and they must be strong enough to answer the demands made upon them during the entire combat.

The reserve is the leader's weapon, which, on the offensive, enables him to shape the course of the action and to force a decision. On the defensive, it enables him to meet the developments of the action as they arise. Adequate reserves must be held for the crisis of combat, but all troops will find a field for activity before or at the close of the battle.

The location of the regimental and brigade reserves will depend largely on the topography, the amount of cover, and ease of communication. They would, in the general case, be placed respectively at not more than 1,000 and 2,000 yards behind the firing line.

The knowledge of the situation that the leader possesses must guide him in fixing the strength of the reserves. On the offensive one-fourth to one-third of the entire force is held out at first as a reserve in all units down to and including the regiment. In the passive defense, after the requirements of the firing line are fully provided for, the governing consideration in fixing the strength of the reserve is the vulnerability of the flanks. Where the flanks are secured by other means, a reserve as low as one-eighth of the entire force may suffice. In the defense seeking an opportunity to attack, the change from the defensive to the offensive, together with the requirements of flank protection, requires strong reserves. Here it may be necessary to hold out at first, for this purpose, as much as two-thirds of the entire force.

In an attack involving forces of the size of a division, or larger, the brigade reserves protect the flanks of the attacking lines, support such lines if they be repulsed, meet counterattacks, secure the captured position, thus giving the disordered attacking lines time to reform, and initiate the pursuit of the retreating enemy. In the brigade on the outer flank of an enveloping movement the reserve may be used at the last to extend the line. In the defense, the brigade reserve is used to protect the flanks of its firing lines, to support such lines if driven back, to make local counterattacks, and to cover the retreat of its firing lines, if the latter be compelled to withdraw from action.

In divisions, the division reserve is used to meet enveloping or turning movements; to make an enveloping movement where the situation of the division permits; to fill in gaps that may develop between its own divisions and others on its flanks during the course of the action; and to make counterattacks. A decisive engagement will call for the use of all or nearly all of the reserves before a decision is reached, but if any part of the reserve remains in hand when a retreat becomes necessary, it will be used to cover the withdrawal from action and reformation of the deployed lines.

In army corps the general reserve may be smaller proportionally than in the division acting alone. Its function is not to reinforce divisions in action, or to be used piecemeal in any part of the field. It finds its best use as a mass of maneuver to envelop or turn the enemy's position, to meet similar moves on his part, or to change the character of the action, as from defensive to offensive.

Artillery that can find active employment anywhere in an action is out of place as a reserve. When the unit of which it forms a part is held as a reserve, it remains a component part of such reserve unless detached for active use in some parts of the field under the orders or directions of the superior leader.

The value of cavalry as a reserve lies mainly in its mobility. The cavalry division gives the leader of the field army a valuable and powerful weapon with which to meet any crisis in combat which demands the employment of troops possessing the highest mobility. But to rely wholly upon cavalry for a reserve is to restrict the sphere of activity of that arm. Reserves other than those composed of cavalry must be provided for.

The position of the general reserve should be such as to enable it to respond best to the most probable demands to be made upon it. The actual location will be determined by the situation as estimated by the commander as well as by the available roads, natural cover, suitable camping places, etc. No definite rule can be given as to its distance behind the line, but it may be said that suitable locations for the general reserve of a division occupying a defensive position would usually be sought between the limits of from one and a half to three miles behind the front line.

Plan of Action: Upon the information of the enemy and of the terrain obtained by reconnaissance and, as far as time will permit, upon the study of the terrain in the field of probable operations made by the leader, the plan of action is based.

After contact is gained the decision will be to attack, to take up a defensive position, to withdraw, or to change the direction of march. The offensive must be the rule, to be departed from only for uncontrollable reasons.

The following factors must be considered in arriving at the decision: The mission, relative numerical strength of the opposing force, relative efficiency of the troops on both sides, the terrain, and the probable results of victory or defeat. In doubtful cases aggressiveness and initiative will usually win. To take up a defensive position, to withdraw, or to change the direction of march so as to avoid contact with the enemy may be a conservative or prudent course to follow in doubtful cases, but such a course will not bring victory nor shorten the campaign. The mission of an army in war is to win battles. Every step taken must be with that end in view.

Combat Orders: The initial combat orders of the division and of all units higher than the division are almost invariably written. Troops may be put in motion in the desired direction, especially in a rencontre engagement, by fragmentary or verbal orders, but such orders must be followed as soon as possible by written orders. After the action has begun the greater number of the orders given by the higher commanders will be fragmentary and verbal. In units higher than the regiment all such orders will, as far as practicable, be written out by a staff officer at the time they are issued, and a copy thereof be given the officer charged with the execution of the order, if possible at the time the order is delivered, otherwise as soon thereafter as it is possible to furnish it.

Troops deployed and under fire can change front only at the risk of incurring heavy losses. When they are once committed to any line of action, change to another is costly both in men and morale. It is impossible for the higher troop leaders to directly influence the course of an action once begun in any way except through the use of such reserves as may be at hand. Modern fire effect will not permit the higher leaders to change abruptly the course of action of troops already engaged by the mere sending of orders, verbal or written, to the commanders of such troops.

These principles must be borne in mind in issuing combat orders.

Combat orders are the expression of a fixed decision and must definitely state the end in view, such as "To attack," or "To take up and defend" a position. Vague or ambiguous orders indicate vacillation and the absence of any definite decision on the part of the officer responsible for them. Troops have a right to be told, in terms that are direct and unmistakable, exactly what it is their leader wants them to do.

Development and Deployment for Action: In armies, the objectives assigned to each army corps are necessarily of a general character and are determined some time, often several days, preceding probable combat. The objective determines the route of march for the army corps and the manner in which such march is conducted. The object is to place the army corps in preparatory positions from which development for action can be best accomplished and the divisions moved most expeditiously to their allotted tasks.

In the theater of possible operations, forces larger than a division will march in more than one column unless the only routes available are such as would place the different columns outside of supporting distance of each other. Divisions are within supporting distance of each other when not more than a day's practicable march apart, and when the intervals between the heads of the different columns are such as will not permit the enemy to interpose his force between them. In army corps the intervals between the divisions in march must be such as will permit simultaneous development and deployment for action, without crowding the troops or unduly extending the line.

When an encounter with the enemy is probable, every available means will be taken to gain information and to lessen beforehand the time that will be required in the deployment for action. Single route columns of such length that the rear elements are out of supporting distance of those in the lead, must be shortened by an extension of front, as far as security and the terrain will permit.

This extension is secured by breaking the single column into two or more parallel columns, rather than by an extension of the front of such units, as for instance, marching in columns of platoons—a difficult and fatiguing method of march. As the enemy draws nearer and combat becomes imminent, these columns are again broken up into smaller parallel columns, until the final development is such as to insure rapid deployment and still retain sufficient depth in formation to enable the leader to meet the after requirements of the situation.

The Rencontre: In the rencontre, where there is no surprise, success depends mainly upon efficient troop leading. To well-trained and well-led troops the attack in the rencontre is natural, and presents fewer difficulties than under any other condition of warfare. Quick decision on the part of the leader is possible, if he has thought out beforehand and keeps constantly in mind what he will do when the enemy is encountered. On the march he must take care to change the details of his mental plan to fit the changing conditions of terrain. This principle applies to all leaders, from the superior commander down to the commander of the advance party on the march or of the outguards when in camp.

The Attack: In combat, where the force involved is as large as or larger than a division, a simultaneous effective advance against the entire hostile front is out of the question. Modern battles are made up of a number of local combats, where success or failure in any one instance may decide the issue of the entire battle. Fronts occupied by army corps are but seldom continuous, even in comparatively flat and open country. Some parts of the line will be held much more strongly than others, and the natural defensive features of portions of the front may render part of the line naturally impregnable.

It is necessary, therefore, to select in the enemy's position limited sections, against which the decisive attacks will be made; but to insure success, the attention of the enemy must be held along his entire front. The attack thus develops into two parts; one whose task it is to actually assault the hostile position at selected points, if assault be necessary to drive the enemy out; the other whose task it is to threaten or to actually attack all other parts of the enemy's line, in order to hold the hostile troops to their position and to prevent the strengthening of the points to be assaulted.

As fire superiority is the first and most important requisite to success, it must be obtained at the start and maintained throughout the action. Fire superiority depends mainly upon the volume of the fire. A frontal attack alone against the hostile position may give no opportunity to obtain a greater volume of fire than that of the enemy, unless the latter's lines be unduly extended. Where that condition exists, a combination of a frontal with a flank attack promises the best results. The enemy is attacked in front by part of the force, while the remainder is directed against one of his flanks with a view to enveloping it. A successful envelopment of both flanks of the enemy, simultaneously with the frontal attack, is made possible only by a decided numerical superiority on the part of the attack. An attempt to envelop or to attack both hostile flanks, without an attack in front, entails a dispersion of force so rarely justifiable as to deserve no consideration.

In armies and in large army corps only the direct attack is practicable as a whole. But in the local combats of the smaller units into which the entire action is divided envelopment is usually practicable.

The terms "frontal" and "enveloping" attacks have no significance so far as the ultimate relative positions of the contending forces are concerned. Unless the enemy blunders or is decidedly numerically inferior, the enveloping attack finally becomes a frontal attack, so far as the brigade and smaller units involved are concerned. It must be expected, therefore, that all attacks, no matter how initiated, will ultimately be made in a direction normal to the position of the troops opposing them.

Selection of Enemy's Flank to Envelop or Turn: In the selection of the flank of the enemy against which to direct the enveloping or the turning movement, the governing considerations are both tactical and strategical. Tactical considerations point to the selection of that flank of the enemy which is weakest in position or in troops, gives ease in approach, affords cover to the enveloping or the turning movement, and where the defeat of the enemy will prove most disastrous to him. Strategical considerations direct the attack toward that flank of the enemy where, if successful, it will drive him away from his line of retreat and cut him off from his nearest supporting troops or the possibility of reenforcements. The possibility of defeat and the resultant position of the attacking troops must also be considered. Where tactical and strategical considerations conflict, tactical considerations must govern. The gaining of the decision in combat is of primary importance.

The Enveloping Attack: The advantages of envelopment lie mainly in the longer concentric line employed, which gives a greater volume of fire, or a fire that is converging upon the enemy's position, and which may enfilade part of the enemy's line when he is compelled to form a new front or to refuse a flank of the old to meet the enveloping attack.

Turning Movement: In forces larger than a division turning movements may be used in conjunction with a frontal or a frontal and enveloping attack. As a turning movement separates the entire force into two parts, each for a time outside of the immediate supporting distance of the other, both the holding and the turning force should be made up of all arms, and each force should be strong enough to maintain itself in position without calling upon the other for support. The turning movement is justifiable only when it can be made in such a manner as to permit of dividing the entire force, without giving the enemy a favorable opportunity to defeat the separated parts in detail.

A careful distinction should be made between a turning movement in which a division of force occurs and an enveloping attack in which the parts keep within supporting distance of each other.

The Assault: If the hostile lines are held by good infantry, properly led, and supported by good artillery, fire action alone will not bring about a decision. For this purpose the assault will be necessary.

In large forces assaults are local and not general. Combined assaults in forces larger than a division are not practicable, nor can the assaults of several divisions along an extended front be coordinated in time. Each battle unit to which has been assigned a distinctive mission must time its assault according to conditions in its own part of the field, but other units must keep the enemy in their front so occupied that he cannot concentrate a heavy force to meet the assault or to make a counterattack.

While the plan of the superior leader under which the first deployment for action takes place may have in view, in a general way, an assault of certain portions of the hostile lines in the attack of an enemy in position, or the forcing back of a portion of the enemy's line in the rencontre, the point of the assault cannot be definitely fixed until the attack is well developed. For that reason the different parts into which the attack is divided must be so handled and the reserves must be so placed, that any portion of the line may be pushed to the assault when the proper time comes.

Selection of Objective: When the time for the assault arrives, all the firing lines will have advanced far enough toward the enemy to disclose the weak and the strong points of his lines. The selection of the objective of the assault and the time for launching it rest preferably with the superior leader in that part of the field, but conditions may arise which justify subordinate commanders in moving to the assault, or the impulse for the assault may emanate from the troops engaged and not be the result of orders. In the absence of orders, subordinate commanders are not justified in pushing to the assault, no matter how promising conditions in their front may be, if there are not reserves available in their part of the field to insure success, or if success would in any way interfere with the general plan.

Support by Fire: As soon as the decision to assault is made, all the fire that can be brought to bear by artillery, machine guns, fire of position, and from other parts of the firing line will be directed upon that part of the enemy's lines selected for assault. The artillery must support this assault to the end, regardless of the losses it may sustain, and must continue its fire up to the moment of the charge, even at the risk of some of its projectiles striking among its own infantry.

The Pursuit: Only by means of an energetic pursuit of the beaten enemy can the full fruits of victory and decisive results therefrom be obtained. It is not the mere defeat of the enemy's army, but its destruction, that ends the campaign. The task of the victorious army is less than half performed when it remains satisfied with the mere possession of the battle field. Pursuit must immediately follow victory, and every effort be made to continue contact with the enemy, day and night, up to the absolute limit of physical endurance of the troops.

Minimizing Failure: Though a commander should never lessen the confidence of his troops by permitting it to become known among them that he himself has any doubt of success, nevertheless if he be fitted to conduct any large operations, the commander will have ever present in his mind the possibility of disaster and distinct plans for minimizing the results of failure. He will necessarily be forced to take into his confidence some of his officers, and much of his ability to command will be demonstrated by his selection of these. Where a rapid advance toward any special objective is being made the commander should know at every stage of the march exactly to which position he proposes to fall back in event of the failure of his mission. He should know which of his officers is to take command of the troops covering the retirement, and what troops these shall be. As a general rule the reserves for the day will be the troops selected to cover the retirement, but this is only a general rule.

Frequently troops which have been most successful in the action can be best trusted to perform this duty. As a general thing it is better to have tired veterans than fresh raw troops for the difficult work of holding back an enemy flushed with victory.

A retreat to a previously prepared position or to a position previously selected takes from defeat a great portion of its damaging effect. The troops finding themselves defeated on a field of battle and immediately rushed back by their officers to a definite position there to make a stand in accordance with what is plainly a well-thought-out plan, lose no confidence in their officers because of their defeat—in fact, their confidence will be increased if they see that those in whose hands their safety rests are thinking of all contingencies. On the other hand, the officer who has led troops into an untenable position and who is carried from the field in a rout over which he regains control only after many miles have been placed between them and the enemy has lost the confidence of his men forever.

VIII

The Offensive in Trench Warfare

Fire superiority must be obtained in the early stages of combat and maintained to the end. Without it, success cannot be expected either on the offensive or the defensive. It affords the best protection that can be given troops advancing to the attack, as also the best means of diminishing losses. The artillery must cooperate with the infantry in obtaining and maintaining fire superiority. Deficiency in the volume of fire on the defensive should be offset by the selection of a position naturally strong, or that can be made strong, in the time available for that purpose.

The attack on the vast intrenched positions of the western European front involves to-day special methods due to the conditions there found. The defensive position, on each side, is practically continuous from the North Sea to the neutral Swiss frontier, so that the flanks are secure and literally cannot be turned.

The attack must therefore be made from the front against an intrenched zone of indefinite depth, consisting of many lines of trenches and parallel positions; capable of indefinite supply and munitionment, limited only by the resources of the country; under continual improvement as to fortification, obstacles, and underground shelter, concealed emplacements and communications; and occupied by a powerful, well-trained enemy supplied with every known means of offense and defense.

It has long been held suicidal to attack by assault intrenchments occupied by well-trained, unshaken infantry supplied with sufficient ammunition; so, in the trench warfare of Europe, the attacking force to get fire superiority must bend his efforts toward preventing the hostile infantry from manning the intrenchments during the assault.

Before the present war it was generally thought that the object of infantry fire was to obtain fire superiority over the hostile infantry. Recent experience teaches that it is rarely possible for the attacking force to get fire superiority by the use of infantry fire alone. The enemy is usually protected by covered trenches—not even a head is exposed. The support of artillery and machine guns is more necessary now than ever before. The adoption of the offensive implies a preponderance in these arms. For the attacking infantry to succeed in an assault, powerful assistance from artillery of all calibers is needed. The artillery preparation with a degree of thoroughness and detail unknown before this war is an essential preliminary to a successful infantry attack.

The work to be done by the artillery is:

1. To destroy wire entanglements and other obstacles in front of the hostile trenches.

2. To level down parapets, destroy emplacements, smash shelters, block communicating trenches so that the enemy will have to stay in his dugouts during bombardment and will be delayed or prevented in returning to his firing position when the bombardment ceases.

3. To seek out especially and destroy all machine-gun emplacements.

4. To silence or disable the hostile artillery.

5. By a barrier fire on the approaches to the position assaulted to prevent the enemy bringing up reserves and reenforcements.

Artillery Ammunition: The amount of ammunition required for the artillery has reached unheard of proportions in the present war. At the beginning of the war both France and Germany had a reserve supply of small-caliber field gun ammunition of about 2,500 rounds per gun and a corresponding amount for the larger field pieces on hand and were well equipped for manufacturing ammunition of all kinds in large quantities. Notwithstanding their reserve supply, considered enormous at that time, and their manufacturing facilities, both nations found themselves seriously short of ammunition in the early stages of the war, and France at least had to curtail her operations for some time.

The present views are that the reserve supply of ammunition per gun to be kept on hand should be that necessary to wear out the gun; in other words, during peace a sufficient amount of ammunition should be accumulated for each gun to enable it to fire as long as it is capable of doing so. For a 3-inch field gun this amounts to about 5,000 rounds per gun.

Shrapnel is quite as important as high-explosive shell, both in field guns and in the smaller trench mortars, and asphyxiating shell and bombs are not infrequently used.

Preparatory to an attack the roar due to the discharge of the pieces and the detonation of the high-explosive shell is practically continuous. Small cities and towns formerly occupying the country through which the trenches of the western front in Europe pass have been entirely obliterated; in some instances there remain absolutely no signs of former habitation and the ground appears like a photograph of the moon—a surface of craters.

This artillery fire drives the defenders from the trenches into the dugouts and frequently buries them there. The effect of the high-explosive shell on the personnel when exposed to their detonation is paralyzing even when it does not result in death. Under cover of this fire the assaulting troops leave the trenches and creep forward to the edge of the barrage ready to deliver the assault the instant the artillery fire ceases. Pieces aimed too low drop their projectiles in the midst of these men but this is unavoidable, and the losses resulting from their own artillery fire are infinitesimal compared to what they would be if the assailants could not reach the enemy trenches before the defenders recover sufficiently to man machine-gun emplacements.

Where the character of the terrain does not permit of a thorough artillery preparation, or where by especial skill in the construction of trenches the attack has been repulsed and the assailants have found by experience that an assault even after the most costly artillery preparation cannot hope to succeed, recourse is had to the use of asphyxiating gas.

Awaiting a favorable wind (which means a light wind toward the enemy trenches) great clouds of chlorine or bromine gases are released. These being much heavier than air, search out very low spots as they are gradually swept toward the enemy trenches, and on reaching these trenches, pour in, filling the intrenchments and bombproofs. Unless the defenders are prepared against this form of attack, the results are as terrible to the individuals as they are disastrous in a military sense. The men die in agony and the few survivors develop tuberculosis and other lung diseases which usually result in death in a short period.

Where trenches are very close together, and local effect is desired, the discharge of burning oil also has been resorted to.

These forms of attack, a throwback from the dark ages developed with all the efficiency of modern science, intensify the bitterness of any struggle and unvariably lead to cruel reprisals. Doubtless they will be forbidden in any rules of land warfare hereafter written.

The following extract from the "International Military Digest" shows the present development of this method of attack:

> The method of discharging asphyxiating gases depends upon the distance. If this be short, cylinders are employed similar to those used in the inflation of balloons. For greater distances, projectiles particularly those of the heavy field artillery, must be employed. The projectiles of this class employed by the Germans are of two distinct types, marked with the letters "T" and "K," because they are used under different circumstances. The ogives of both are painted black to distinguish them from other projectiles, and carry the letters just mentioned.
>
> The "T" projectiles disengage gases of great density susceptible of hanging for a long time over the zone in which they are produced. Hence, they are employed preferably in curtain fire. The "K" projectiles are lighter and are used to batter points to be assaulted and crossed. In general the use of asphyxiating gases is now completely regulated in the German army. The officer of the battery which is to fire them is responsible for their use. Rain, cold, and head winds absolutely prevent their employment. Against woods they always give good results. As preventive measures, certain masks are carried to be put on when necessary.

Grenades: The trench warfare of Europe has again brought into use the ancient practice of hand grenade and bomb throwing, and these weapons play almost as important a part in trench warfare as the rifle. In another form as rifle grenades they are used for long-range work.

Hand grenades can be used advantageously to prepare for an assault in crossing the last sixty to one hundred paces; in hand-to-hand fighting; to facilitate and cover the destruction of obstacles; to drive the defenders from fortifications; to clear out the firing and communication trenches of field work after partial capture during an assault; in the defense of fortified positions against assault; in defense against sapping; for reconnoitering patrols and outpost lines; for cavalry.

In the assault the grenade thrower, especially selected for his skill, carries a bucket filled with bombs. He is accompanied by two carriers and two riflemen, who protect him at close quarters.

Trench Mortars: Short mortars are used to fire, at a high angle from the bottom of the trenches. They use shells as large as 12 inches in diameter up to a range of about 400 yards.

Sapping and Mining: Mine warfare offers about the only method left of taking the enemy by surprise and unexpectedly making a large breach in his trenches and entanglements. If extensive enough, mines may also destroy the flanking emplacements of the breach and permit the rapid and comparatively unopposed advance of assaulting troops through the breach into the disorganized trenches, where they can rapidly fortify themselves without being under fire from flanking machine guns of the enemy.

Mine warfare begins when the opposing lines of trenches are close together, say about 100 yards. It begins by the construction of saps toward the enemy's lines; these are joined up at short intervals of 30 or 40 yards by parallels. When the saps are so close that the enemy can interfere with the work by throwing grenades on the sappers, the latter dig underground galleries which end in a mine chamber under the enemy's works. Explosives are placed in these mine chambers and the charges fired at an agreed upon time. The assault and occupation of the craters takes place immediately after the explosion.

Listening galleries and countermining are employed to combat this method of attack. The introduction of asphyxiating gases into the mines and galleries is also practiced by the enemy.

Methods of ventilation become important in long galleries and portable respiratory apparatus is provided for the workmen in shafts that are infected with poisonous gas or suspected of such infection.

Use of Machine Guns: Machine guns have the advantage of concentrating in small space a volume of fire equal to that of thirty to fifty riflemen. They can be more readily concealed and maneuvered than the equivalent number of rifles. Their disadvantages arise from the rapid expenditure of ammunition and the consequent difficulties of adequate supply. Machine guns are therefore to be used at certain critical times when their moral effect on the enemy and the sacrifices necessary to secure the supply of ammunition are commensurate with the results expected or obtained. The present war has put the machine gun in the front rank as a weapon that economizes men. The Germans are said to have had 50,000 machine guns at the beginning of the war and to have doubled this number during its progress. The stationary character of the fighting in trench warfare permits the accumulation and supply of immense quantities of ammunition, and therefore a more liberal expenditure is justifiable when effective results can be thereby obtained. The Germans are said to assign machine guns to cover certain sectors of the enemy's defensive lines and to keep them constantly at work especially at night battering down the French trenches and making life miserable for the occupants. Machine guns that are constantly in action are very likely to be discovered by the hostile artillery and eventually put out of action during the artillery preparation preceding a general infantry attack.

Those most to be feared are the machine guns that have not been discovered and that keep silent in well-chosen flanking positions until the assaulting infantry is launched on its attack. They then open fire on restricted passageways through the entanglements, on ravines and covered or partly covered lines of approach where the attacking troops are likely to be crowded or delayed, and where the execution will be terrific.

Machine guns are therefore frequently held in deep shelters until the artillery bombardment has ceased and then they are brought up by hand through subterranean galleries to the emplacements prepared for them.

It would seem desirable to have two types of machine guns available, one light and portable so that it can advance rapidly with advancing troops being carried by one man, and the other more stable on firmer mountings and therefore less portable but suited by its steadiness for longer range firing.

Machine guns are always useful in moments when surprise is intended. They permit a rapid utilization of terrain, or quick taking advantage of changes in the situation.

Germans use very strong concrete machine-gun emplacements in their front and secondary lines; these are combined with very deep dugouts for the protection of the gun's crew. During a heavy bombardment the gun crew with gun remain in the dugout, coming out only just prior to an attack.

Cooperation of the fire of artillery, machine guns, and infantry is most important; in fact, it is absolutely essential, and is carefully arranged for by visual signaling.

The effective use of machine guns will be generally for short periods of time—at most but a few minutes—until silenced by the enemy. When engaged they must be used to the limit of their effective capacity. On the offensive they find their use in assisting the attack to obtain fire superiority temporarily lost and against lines of trenches which are to be assaulted. In the defensive they are used against large targets visible for a short time only, and on advancing lines of the enemy's infantry within the close and effective ranges. The effect of the enemy's fire, particularly his artillery fire, on machine guns, is lessened by their employment in small groups.

The Attack Upon an Intrenched Position: In the trench warfare of Europe the magnitude of assaults has increased enormously. Experience soon proved that the penetration of the hostile intrenched lines through a gap only four or five or ten miles wide reaped no permanent advantage even though many lines in depth were captured. The enemy's resistance stiffened up as they were pushed to the rear, the advancing salient of the attacker became more and more exposed to flank attacks by reenforcements brought up on either flank, and finally the advance came to a stop, perhaps to hold for a time the ground won, or more frequently to be driven back sooner or later by vigorous counterattacks on the part of the enemy.

Then came the development of assaults made over tremendous fronts, fifteen to twenty-five miles, after intense artillery preparation and under cover of barrier fire. In these attacks the assaulting columns do not advance from long distances, as in open maneuver warfare, but first push up by saps and trenches to parallels of departure as close to the enemy's first-line trench as practicable and from these parallels the assault is made.

Charges which start as far as two hundred meters from a position held tenaciously by the defenders simply invite disaster. Fifty meters is a better distance from which to start the charge. When the position is not penetrated, the assaulting troops must hold the ground gained. An unsupported withdrawal means annihilation.

The assault is then made in a succession of waves of infantry. Prearranged plans for the attack in every possible detail are made, and each man and each unit has its exact duty prescribed and its particular objective. The first wave cannot know exactly the results of the artillery preparation, but their advance immediately develops the resisting points of the enemy, such as strong supporting points, specially sheltered marksmen, and concealed machine guns. Losses in the first wave will be enormous, but the second wave can take advantage of these sacrifices and the knowledge of the enemy already revealed and make its assault in more open order and with less loss.

Special methods of clearing the enemy's trenches by hand and rifle grenades and step by step advance must be provided as soon as the first line of trenches is revealed, and arrangements must be at once made to resist counter-attack. The barrier of fire by the artillery, as before described, must precede the advance of the attacking forces and serve as a screen and an obstacle to the enemy's reenforcements.

The second wave of assault is followed by others in succession, as the advance progresses and gaps are made in the hostile lines. Through these gaps heavy reserves may be thrown to encircle in flank and rear the enemy's supporting points or to sweep on to the second defensive positions of the enemy which lie usually several kilometers to the rear and behind a sheltering crest.

Where a complete success is anticipated, the cavalry is massed for a dash through the captured section of the line. As has been proved by the war on the western front in Europe, such operations, while promising the maximum results, are exceedingly dangerous and may lead to excessive losses.

IX

The Defensive

A FORCE may at times fully accomplish its mission by retaining its position for a specified time with or without combat. Here the object is to avoid giving the enemy the decision, either by avoiding combat altogether or, if he attacks, by preventing him from carrying the position held by the defensive troops. The position taken up is selected, as far as the mission will permit, with reference to its natural defensive features. Since the idea of offensive combat is absent, every advantage is taken of obstacles, natural or artificial, that hinder or altogether prevent the advance of the enemy. Negative rather than positive measures are relied upon to prevent the enemy from seizing the position. In this form of defense the firing line is made as strong as possible from the first. If the flanks are not secured by other means, reserves strong enough for that purpose must be provided, but no reserves need be held for a decisive counterattack. Supports and local reserves need be only strong enough to replace losses, to strengthen or reenforce the firing line where the enemy's attack is most threatening, and to repair breaches in the line.

The purely passive defense is justified where the sole object is to gain time, or to hold certain positions pending the issue of events in other parts of the field. Its results when it accomplishes its mission, can never be other than negative. A passive defense conducted as an end in itself is doomed beforehand to certain defeat.

As a normal thing in defensive, as well as in offensive, operations fire action is only a means used to make ready for a forward movement; in the defensive this means is rendered more effective by the previous choice of the ground, but the forward movement of the troops is still the essential process necessary to break down the enemy's armed resistance and to drive him back decisively after he has been sufficiently weakened by the defender's fire. Thus fortification, fire action, and the will and ability to maneuver are closely related elements all of which must be given due consideration by the commander of a mobile force and the judicious combination of which will bring success.

A force whose intentions are offensive may at times be forced to assume the defensive either voluntarily in order to gain time or to secure some advantage over the enemy; or involuntarily, as where, in the rencontre, the enemy gets a start in deployment for action, or where the enemy's attack is impetuous and without sufficient preparation. In either case the defensive force contents itself with parrying the blows of the enemy, while gathering its strength and looking for the opening to strike a decisive blow.

The crisis of this form of the defensive comes with the counterattack, which marks the change from the defensive to the offensive. Upon the superior leader falls the responsibility of perceiving the right moment at which this change should be made and of having at hand the means necessary to effect it. The general reserve affords him the weapon necessary for his purpose. In this class of the defensive, therefore, strong supports and reserves are essential. The firing line is made as short as possible at first, in order to permit of the holding out of local supports and reserves strong enough to meet all movements of the enemy and to hold the line throughout up to the time of the decisive counterattack, and the retention until that time of a reserve strong enough to make the counterattack a success. An open field of fire for the effective and the close ranges is essential. Obstacles immediately in front of the position that might impede the counterattack are objectionable.

The Counterattack: The part of the enemy's line at which the counterattack will be launched cannot be determined definitely until the time comes to make it. The enemy's attack will usually disclose weakness in some parts of his lines, and supports and local reserves may be used to accentuate this weakness or even to develop it in that part of the enemy's line where the terrain or the position of the general reserve may give the best opportunities for the counterattack.

The counterattack may become necessary where the enemy shows the greatest strength, in order to keep him from penetrating the defensive position. The decision as to the time and the place for making the counterattack rests with the superior leader. All, or the greater part, of the general reserve is used to effect this change from the defensive to the offensive. Local counterattacks by small units are a means of defense and will often be necessary and advisable, but have no direct bearing on the main counterattack, which is controlled by the superior leader. Local counterattacks must not, therefore, be pushed to the extent of committing other than local supports or reserves to the offensive before, in the opinion of the superior leader, the time has come to strike the decisive blow.

The counterattack may be made by launching the reserve against the enemy's flank after he is fully committed to the attack, or straight to the front where weakness in his attacking lines is apparent. The impulse for the counterattack may at times be given by the advance of the fighting line after a repulse of the enemy and the consequent demoralization of his attacking lines.

When the time comes for the counterattack, all the artillery and machine-gun fire available is suddenly turned on that part of the enemy's line selected for the attack. This must not be done until the troops are ready for the attack. Otherwise, the enemy may discern the intention in time to make preparations to meet it either by reenforcing that part of his line or by pushing the assault in another part of the field.

Cavalry in Defensive Combat: In all defensive combat cavalry has even a more important rôle than it holds in the offensive. It must always be ready to come immediately to the assistance of the infantry and to make any sacrifice necessary to ward off the defeat of that arm. It must be kept near at hand and ready for action, mounted or dismounted, in any part of the field. Its opportunities for mounted action to check the enemy's advancing lines, especially those that threaten the flanks of the infantry, will probably be many. Its cooperation cannot be limited to any part of the battle. It may be able to hasten by its action the time for the counterattack or to create the opportunity for such attack. The superior leaders must be in immediate communication with the cavalry commander throughout the action, and the work of the cavalry must be so coordinated with that of the general reserves that each will be prepared to seize any opportunity created by the other. The general reserve and the cavalry, together with all the artillery not fully occupied elsewhere, are the means available to the superior leader to change from the defensive to the offensive and to make such change successfully.

In trench warfare of long duration the horses of the cavalry may be assembled and cared for well to the rear and the personnel be required to perform duty in the trenches.

The Defensive

Defensive Positions: A semipermanent defensive position taken up in the open may in certain cases develop from the first outpost rifle pits and trenches and may in the other direction grow into the vast and complex maze of trenches and communications observed where the Germans and Allies face each other in northeastern France.

Before deciding upon taking up and occupying a defensive position two conditions must be fulfilled.

First. The direction of the enemy's advance must be definitely fixed.

Second. The enemy must find it necessary to carry the position in order to accomplish its mission or to keep the defending force from accomplishing its mission.

The preliminary step to a defensive position may be a position in readiness. This would be appropriate when it is intended to resist the advance of the enemy in the immediate vicinity and when knowledge of the enemy's movements is not sufficiently definite to decide upon a plan of action.

In such case defensive positions should be tentatively selected covering all probable lines of approach of the enemy, but none of them should be occupied or strengthened until a definite selection can be made. If, however, there be a line or a supporting point common to all the tentative positions which must be held no matter what the direction of the enemy's advance, it should be occupied at once and strengthened. The infantry necessary for its garrison should be assigned to it without delay.

The remainder of the infantry will be held near its most probable position in the ultimate defensive line. The artillery will be placed in readiness to command all, or at least the most probable, lines of approach of the enemy and where it can be readily moved into firing positions when required.

Selection of the Line of Defense: Of all the problems of the military art that of the fortified organization of a position is one of the most difficult to solve, because the data of the problem can be known only very imperfectly, and often the time available for working it out is extremely short, since the commander is compelled to delay his decision until he has sufficient information of a definite character concerning the movements of the enemy.

The first duty of the superior commander is to select the general line on which to make his main resistance.

Though the extent of ground actually held when the direction of the enemy's advance is definitely known must be strictly limited by the numbers available, the extent of ground reconnoitered and prepared for occupation may be much larger and should admit of various alternative distributions of the force to meet the various courses of action open to the enemy.

Strategical considerations will influence the selection of the line, but tactical requirements and local topography are the governing factors. Often there is no choice but to take up hastily the nearest available position.

The line is usually selected in a general way from maps, but before its final occupation it should invariably be reconnoitered by the commander or his agent to rectify errors and prevent gaps or overlapping of forces. This reconnaissance should, whenever practicable, be extended to cover the routes leading to the enemy and openings or passageways that might favor counterattacks and offensive returns by the defending troops. When time permits, a possible second line of defense in rear of the position, where the troops can prolong their resistance in case of reverses at the front line, should be selected by the commander, but not necessarily made known to the troops or the subordinate commanders.

The general location having been decided upon the actual position to be intrenched, should fulfill as many as possible of the following conditions:

(a.) A good view with suitable field of fire to the front and flanks;

(b.) An extent of line suited to the size of the command;

(c.) Easy communication along the rear of the line and to the rear;

(d.) Concealment of trenches and of a large part of the force;

(e.) Ground in front that should impede the enemy's advance but leave good opportunities for counterattacks upon him;

(f.) Efficient lines of retreat in case of a reverse;

(g.) Well-protected flanks;

(h.) No prominent salients if they can be avoided.

Occasions seldom arise in which a defensive position will be taken up in a uniformly flat or open country; there will generally be a succession of hills, spurs, or other high ground, and in practically all positions there will be localities of special tactical importance. It is on localities of this nature that the principal efforts of the defenders should be concentrated in order that they may form pivots on which to hinge the defense of the rest of the position. They may be commanding features of the ground, groups of substantial buildings and inclosures, or wooded knolls giving cover from view, and a good field of fire to the front and flanks.

The defensive line will then consist of a series of naturally strong centers intrenched and fortified, called supporting points, each within supporting distance of its neighbor. The line will thus be determined in a measure by the natural formation of the ground. This series of points presents a line through which an enemy cannot easily pass if the garrisons are proportioned to the front to be defended. In order that all ground between adjacent pivots may be covered with close rifle and machine-gun fire the distance between them should seldom exceed 1,200 to 1,500 yards. The size of the garrisons for these supporting points depends on several considerations, such as the strength of the force of the enemy likely to be directed against one or more of the supporting points, the natural strength of the ground, the ease of interior communications and the size of the general reserve. Ordinarily it will be found that these pivots can be satisfactorily garrisoned with a force varying from two companies to a battalion, the usual size being one battalion. The main objection to a line of defense of this character is its weakness under artillery fire. This can be largely obviated by making the best of concealment and cover and by reducing the garrisons to a minimum when exposed to such fire, holding the greater number of troops in reserve under shelter.

Organization of Lines: Every defensive line, whether intrenched or not, consists of a wide zone composed of two main parts: First, an outer line of resistance, including advanced lines of observation; second, mobile reserves capable of moving on interior lines. After deciding upon the line of resistance, the next duty of the commander will be the division of his troops into advance line and reserve. The assignment of the advance line to various portions of the front will be his next concern, and we thus see that the superior commander's duties resolve themselves into two: a parallel division of his troops into reserves and advance line, and a perpendicular or radial division into sections of the line of resistance. The next subordinate commander makes corresponding divisions of his troops, and this process is continued down to the smallest unit on the firing line, namely, the company.

In deciding on the radial divisions of his front the commander must make up his mind what depth of troops he will provide for the advanced line. Trenches must be able to furnish enough aimed rifle and machine-gun fire to stop any ordinary infantry attack. This will vary greatly according to the terrain. The enormously increased power and rate of fire of modern rifles make it possible to hold off the attacking force at a much greater distance than formerly, especially in open country, and permits a reduction of density to be made in many places, instead of the old rule of one man per yard of front. Men cannot use their rifles if occupying a less space than about a yard of front. This may be assumed therefore to be the maximum density in the firing line itself, or including supports and local reserves, say two men per yard. No trench, if persistently held in such density by good troops with modern arms, can be taken by frontal assault unless by greatly superior numbers and when shaken in morale by the artillery preparation. With machine guns in the trenches, the number of troops can be further reduced. It has been estimated that the machine gun is equivalent to from thirty to fifty rifles.

The Defensive

As before stated, the line of defense consists mainly of a succession of supporting points. It is desirable to analyze a little further the nature of these units.

Supporting points play an important part in offensive as well as in defensive combat. They permit an economical use of troops, aid in checking the enemy with fewer men, insure holding captured ground and prepare for an advance movement in the open field.

Like all other works executed on the battle field, supporting points must have a purpose suited to the needs of the situation, and premature organization of positions must be avoided to prevent waste of time and labor and the possibility of being committed to combat that will not make the best use of the situation.

The simplest works are the best; they should permit the occupying troops to have a good view of the ground in front and be favorable to the assumption of the offensive at any moment; they should shelter the defenders as much as possible from projectiles and afford convenient arrangements for firing and for rest.

The first step in fortifying a supporting point is to organize its edges. The location of the front-line trench is dependent on the view it affords over the zone of the attack; the defenders must have sheltered communications and, if possible, a second position must be located in rear to sweep the forward position and prevent the enemy advancing therefrom. The salients, the flanks and all weak points are reenforced by trenches.

Dispositions for the defense of particular localities have this feature in common, namely, recognition of the importance of all avenues of approach, around which the greatest effort must be made by both attacker and attacked.

It is well recognized that the old pattern of closed work or redoubt has entirely given way to the modern group of trenches, so placed as to develop the utmost defensive strength.

The supporting point should have trenches to provide practically all-round defense; in any case the flanks should be well bent back so that if a neighboring work should be lost, there would still be strong power of defense to the flank. If obstacles are used they should be continuous entirely around the supporting point. During the Russo-Japanese War these pivotal points were fortified by the Russians with redoubts or other closed works, and were often congested with men, making excellent targets for artillery. Losses in such cases were often unduly great.

The Austrians in western Galicia held the trenches with one man every thirty inches or one and one-fifth men per yard. They were constructed by the troops themselves. First, the supporting points were seized and fortified, and then they were connected by firing trenches, forming practically a continuous line. Traverses five to six feet wide were left between squads, and between the traverses in front of the trench were shelters for the squad. In rear 50 to 100 yards were shelters for companies or battalions, shrapnel proof, and arranged for the men to lie down.

Having selected the supporting points, the next step is the location of the front line of trenches on the ground.

The prevailing opinion until the last few years has been that a clear field of fire up to the effective range of modern rifles is extremely desirable.

In the withdrawal from action it is desirable to withdraw first the troops that can be most readily disengaged from the enemy. But the terrain may dictate the withdrawal first of the troops that are the hardest pressed, in order to prevent them from being cut off or forced away from the line of retreat.

Selection of good positions to cover the withdrawal is the most important requisite in retreat. The first covering position taken up should be far enough to the rear to prevent the troops occupying it from being directly influenced by the withdrawal from the main position, and yet near enough to such position to exert at once an influence on the action when the withdrawal begins, and to cover the retirement of the advanced lines. Defeated lines will usually be forced by the enemy's attack to retreat straight to the rear, and the covering positions selected should be located preferably to the flanks of the lines of retreat. They must afford also facilities for ready withdrawal of the occupying force. If any reserves remain at hand, they occupy the selected position and immediately make dispositions to cover the withdrawal of the advanced lines. The maximum fire effect at the long and effective ranges is desirable, and this is gained by making the firing line as strong as possible. Supports and reserves for this line are reduced to a minimum. Machine guns so placed that they can open suddenly upon the lines of the enemy are a very effective means of stopping the pursuit. A clear field of fire at the close ranges is not necessary in a covering position. The position of the artillery may be still farther to the rear, but always within effective range of the main position in order to bring fire to bear upon the enemy's pursuing lines as soon as the withdrawal from the main position is under way.

Successive Covering Positions: When retreat is decided upon it may be necessary to take up successively other covering positions farther to the rear before the advance of the enemy can be checked long enough to give the time necessary to properly organize the retreat, to bring the troops from the deployed battle formation into an orderly column of march, and to enable the rear guard to take up its duties in an effective manner. The principles governing the selection and the occupation of the first covering position apply to all the others. Their occupation is for the purpose of gaining time and putting as great a distance as possible between the main body of retreating troops and the pursuing enemy.

Delaying actions are of two classes: One in which the advance of the enemy is delayed as long as is possible without imperiling the safe withdrawal of the delaying force; the other, in which this force must hold its position, regardless of the risks and losses involved, for a time that is dependent upon conditions in other parts of the field or in the theater of war.

In delaying actions of the first class mentioned, the firing line is made as strong as possible from the beginning. Supports and reserves are reduced to a minimum. A clear field of fire at the long and the effective ranges is most important, as the enemy must be brought under as heavy a fire as possible as soon as he comes within range. The terrain must be such as to give ease of withdrawal from the position. A clear field of fire at the close ranges is not necessary. As soon as the enemy comes within assaulting distance the position is vacated, machine guns and mounted troops delaying the advance of the enemy's lines up to the last minute that permits of safe withdrawal.

In delaying actions of the second class mentioned, where time must be gained even at the risk of sacrifice of the delaying force, development of effective fire at the long and effective ranges is an important element. But here the close ranges must also afford a good field of fire. Artillery and machine guns remain in action, even at the risk of total loss, as long as there is a target at which to fire.

Since in all delaying actions the governing idea is to gain as much time as possible before the enemy can come within assaulting distance, the position taken up must be such as will not afford cover to the attack up to the close or nearer effective ranges. Open ground to the front is desirable, in order that the enemy may be obliged to make an early and a wide deployment before advancing to the attack. A maximum extent of firing line is useful for this purpose. Supports and reserves are held well to the rear. Obstacles, natural or constructed, that impede the advance of the enemy are desirable. Defiles that cannot be readily turned offer good opportunities for delaying action.

NIGHT COMBAT

With the increase in range and accuracy of fire, particularly that of the artillery, and the facilities for observation that are afforded by the use of aircraft, night operations increase in importance. Troops must often make use of darkness to minimize losses from fire and to escape observation, to prepare for an assault to be made at daybreak, or to approach a point from which a daylight assault is to be made. Night operations may be necessary also for the purpose of gaining time.

Lord Wolseley's victory over the Egyptian army at Tel-el-Kebir on September 13, 1882, was won by a night march, followed by an attack just as the first light of dawn began.

The attack on the outer ring of forts before Liège in the autumn of 1914 is an illustration. Here General von Emmich launched about 100,000 infantry against the southeastern sectors adjacent to Fort Evequee. The attack began at midnight and lasted eight hours.

Infantry and engineers are generally used for night advances and assaults. Artillery in positions previously taken in daylight may assist in attacking during the night, objectives of known ranges, but careful special measures are needed to secure cooperation and to prevent danger to the attacking infantry. When the enemy is expected to attack during the night the firing line must be made as strong as possible and careful watch kept of and in front of the obstacles.

Illumination of the foreground and of targets for the artillery may become a necessity during the night combats. Field searchlights are useful for this purpose. "They should be on the flank of the artillery whose target they are to illuminate, low down on the forward slope of the position and well intrenched." The beams should be thrown across the front of the position and flashed intermittently on the target so as to minimize the danger of being shot up by the hostile artillery.

When a night attack is anticipated the use of illuminated bombs discharging from trench mortars and falling between the lines is resorted to in order to enable accurate fire to be delivered upon the advancing troops.

X

Marches and Convoys

A SUCCESSFUL march, whether in peace or war, is one that places the troops at their destination at the proper moment and in the best possible condition. In war, marches are of daily occurrence, and success depends in a great measure upon the skill with which they are conducted.

Good marching is secured by careful preparation, strict discipline, and the due observance of march sanitation.

While conforming to other requirements, marches are conducted so as to reduce to a minimum the hardships of the troops.

When possible, ample notice is given so that preparations can be made without haste.

The march is habitually at route order.

Troops are informed of the length of halts so that they can take full advantage of the same.

The men are not kept under arms longer than necessary, nor required to carry heavy burdens when transportation is available.

Special care is paid to the feet of the men and to the hoofs and backs of animals.

In prolonged marches at least one day in seven should be a day of rest.

Forced marches are never undertaken unless the situation requires it, as they seriously impair the fighting power of even the best troops. With foot troops forced marches should be made by increasing the number of marching hours rather than the rate of march, as too rapid a pace will soon wear out the men. The halts and periods for cooking and sleep should be arranged so as to afford the maximum benefit. A maximum day's march for infantry and trains is about twenty-eight to thirty miles.

With mounted troops the gait as well as the number of marching hours may be increased in making a forced march. Under favorable conditions of road and weather a rate of fifty miles in twenty-four hours can be maintained for three or four days. On such marches halts should be made every hour, and a long halt at the end of the first half of each day's march to unsaddle and feed. The rate of march should be about five miles per hour, excluding halts.

As a rule troops on the march pay no compliments; individuals salute when they address, or are addressed by, a superior officer.

The conduct of a march (forming the column or columns, distribution of troops, the start, rate, length of march, etc.), is controlled by the situation and object to be accomplished.

Conduct of Marches: It is the duty of the commander to see that the necessary preparations are made—that the men and animals are in fit condition and that they are properly equipped; that all trains accompanying the command are loaded as prescribed; that proper measures have been inaugurated for the replenishment of supplies, and that the necessary arrangements have been made for the care and evacuation of the sick and wounded.

When practicable, marches begin in the morning, ample time being allowed for the men to breakfast, animals to feed, and the wagons or animals to be packed. The time for reveille and stables should be designated the evening before. Canteens are filled, fires put out, latrines covered, and the camp policed before departure.

The hour for the start depends upon circumstances. As a rule, foot troops do not start before broad daylight, mounted troops, when practicable, about an hour after broad daylight. Both men and animals rest well in the early morning hours.

The rate of march of a mixed command is regulated by that of the foot troops. It varies with the length of the march, size of the command, condition of the troops, and other circumstances; sandy, rough, muddy, or slippery roads, great heat and dust, strong head winds, storms and broken country, reduce the rate. If hills are to be climbed or swampy country is to be crossed, or defiles passed, liberal allowances are made in time calculations.

For infantry the rate prescribed for drill is 100 yards a minute or 3.4 miles an hour; on the road the maximum to be counted on is 88 yards a minute or 3 miles an hour, including halts 2½ to 2¾ miles. The rate of infantry columns, under average conditions, may be assumed at 2¼ to 2½ miles an hour.

The average march of infantry, and of mixed commands consisting partly of foot troops, is 15 miles a day; but in extensive operations, involving large bodies of troops, the average is about 12 miles a day. Small commands of seasoned infantry marching on good roads in cool weather, can average 20 miles a day.

It is of great importance that a uniform rate of march be maintained throughout the column. When a change in the rate is to be made, warning is sent along the column.

For cavalry the rates prescribed for drill are:

The walk 4 miles, the trot 8 miles, and the gallop 12 miles an hour. The average walk of a horse is at the rate of a mile in 16 minutes or 3¾ miles an hour; the average trot, a mile in 8 minutes or 7½ miles an hour.

In the field the usual gait is the walk of 3¾ miles an hour, including halts 3¼ to 3½ miles an hour.

The average march of cavalry, after men and animals are hardened, is 25 miles a day.

The daily march of field artillery is the same as that of the command of which it forms a part; if alone it covers from 15 to 20 miles. The rate of horse artillery is the same as that of the cavalry to which it is attached.

The rate of a wagon train varies with the class and condition of the draft animals, the load, length of the column, and the condition of the roads. While large mules drawing light loads on good roads can cover neardly 4 miles an hour, in long columns a rate of 2 miles, including halts, is all that can be expected even under favorable conditions; small trains may make 2½ miles an hour. The daily march of a wagon train is about the same as that of infantry.

The average load of a pack mule is 250 pounds, and a train thus loaded can travel from 20 to 25 miles a day on ordinary roads or trails; over rough country, from 10 to 15 miles.

The rate of march, the load, and the distance that may be covered in a day with autotrucks or with tractors drawing wagons are dependent on the character and condition of the roads and the carrying or pulling power of the trucks or tractors.

Halts: To rest the men and animals and for other purposes, a command on the march is occasionally halted. The first halt is made after marching about three-quarters of an hour, and is about 15 minutes long, to enable the men to attend to the calls of nature and to adjust their clothing, etc. Judgment should be exercised in selecting the place for the first halt; it should not be made in a village or place where one of the objects of the halt would be defeated.

After the first rest, there is for foot troops a halt of about 10 minutes every hour—that is, the troops march 50 minutes and then halt 10. In very hot weather the halts may be longer and more frequent. The men are allowed to fall out, but remain in the immediate vicinity of their places.

For cavalry the hourly halts are shorter—5 minutes; the men examine the horses' feet, adjust saddles, etc.

For artillery the hourly halts are from 5 to 10 minutes; harness is adjusted, girths are tightened, etc.

As a rule troops prefer to finish a day's march as soon as possible. In good weather, with favorable temperature, long halts are not desirable on marches of less than 15 miles for infantry or 25 miles for cavalry. When the day's march will run well into the afternoon, a halt of about one hour near mealtime is advantageous. Places for long halts should be selected with care; wood, water, grass, dry ground, and shade are desirable features. Arms are stacked and equipments removed; mounted troops dismount and loosen cinches.

In hot weather, especially in the tropics, it may be desirable to avoid the midday heat. If the march is long, the command may make an earlier start, or it may rest for three or four hours during the hottest part of the day and finish the march in the evening. As a general proposition, however, it is undesirable to arrive at a strange place after nightfall or even late in the afternoon. Halts are not made in or near towns or villages unless to procure water or supplies, and when so made, the men remain in column, details being sent for whatever is necessary. In commands not exceeding a regiment, and in wagon trains of less than a mile in length, the units may halt simultaneously, the signal from the head being promptly repeated. This may also be accomplished in longer columns by the commanders of units setting their watches at the same hour before starting, and agreeing when the halts shall be made; the units all halt and resume the march at the moments agreed upon.

When a cause of delay—for example, a damaged bridge—is encountered, the troops in rear are notified of the minimum length of the delay; they then conduct themselves as at regular halts.

In ascending or descending slopes, crossing streams or other obstacles, or passing through defiles requiring a reduction of front, every precaution is taken to prevent interruption of the march of the troops in rear. If the distances are not sufficient to prevent check, units are allowed to overlap; if necessary, streams are crossed at two or more places at the same time; in passing through short defiles the pace is accelerated and the exit cleared at once. If a company unit is delayed while crossing an obstacle, the head slackens the pace or halts until all of that unit has passed; it then resumes its place in the column, increasing the pace if necessary.

Before attempting to cross with bodies of troops, careful examination is made of fords, boggy places, bridges of doubtful character, ice, etc., as the case may be.

When necessary, an officer is designated to superintend the crossing; his instructions must be strictly observed, the troops crossing in formation prescribed by him. Foot troops crossing bridges march without cadence.

Whenever a military bridge is constructed with the bridge equipage, or if deemed necessary, in cases where improvised material is employed, a bridge guard under an engineer officer will be detailed for its care and maintenance during the period of its use. All orders, regulations, and instructions issued by this engineer officer relative to the care, protection, and use of the bridge will be considered as emanating from the superior commander directing military operations in the vicinity or by whose direction the bridge was laid.

When roads lead through swamps or quicksand, or across streams with treacherous bottoms, their limits are marked with stakes or bushes, or warnings are placed at dangerous points. At night lanterns are hung from the stakes, and a fire is built or a lantern hung to mark the landing.

Night Marches: These may be made for strategical or tactical purposes or on account of hot weather. They are useful in making secret concentrations, in securing favorable positions for attack at dawn or in getting out of embarrassing positions. They require special care in their conduct such as guides, men to mark changes of direction and sometimes artificial illumination by building fires along routes where they are not visible to an enemy.

Care of Troops: On the march, commanders of the larger units keep themselves informed of the condition of their commands and of the progress of subordinate units in rear.

Sources of water supply are examined by experts and marked good or bad. In countries infected with cholera or other harmful bacteria, this is imperative.

Precaution is taken to prevent excess in eating and drinking. The drinking of water is often a matter of habit; under ordinary conditions a canteen of water should last one man a day's march. Soldiers should be trained to be economical in the use of water, and to keep a small supply until their canteens can be replenished. If water is plentiful they may drink often, but only a small quantity at a time.

Commanders afford the men ample opportunity for replenishing their canteens, but it is done by order, not by straggling from the command. In certain cases, the advance guard may require the inhabitants to place water in vessels along the line of march for the convenient use of troops. On long marches through country deficient in water, or where the water is bad, it may be necessary to carry a supply in wagons.

The watering of cavalry horses upon the march depends largely on the facilities available.

In hot weather, or if nothing is known about the water supply of the day's march, the horses are watered before leaving camp. Good opportunities for watering on the road should not be neglected. To avoid delay, as many troops as possible are watered at the same time; as the head of a command approaches a place suitable for watering, the several units are conducted, according to their position in column, to the different watering places.

Animals of the artillery and of wagon trains are watered while in camp—before departure and after arrival—or during a long halt. If time permits, they may be watered on the march from buckets, or by unhitching and riding or leading to water.

One of the greatest sources of hardship on a march, especially for infantry, is hot weather. Every precaution is taken to prevent suffering from this cause. Halting places are selected when practicable where there is shade and free circulation of air, and the men are cautioned against drinking too much water. Green leaves or a moist handkerchief in the hat afford relief from the hot rays of the sun. If the men are overheated, care is taken to prevent their being chilled by exposure to cold winds or drafts.

It is possible easily to illustrate the march of a division on a single road and to compare two methods of making the hourly halts to rest the troops, namely the simultaneous halt of all the units in the column of march and the halt by successive units as the head of each reaches a designated halting place. The latter method requires careful timing of the march so that the rear unit will not run into the one immediately in front while the latter is at the halt. The headway between units must be at least equal to the length of time spent at the halt. A diagram would show how to determine graphically the time of starting of each unit from the morning camp so that it will arrive at the next halting place just as the tail of the preceding unit leaves that place. If the marching is uniformly conducted throughout the column each unit will just clear the halting place as the following unit arrives and there will be no overlapping or checking of the march of the units in rear.

In such a diagram the advance guard is taken as one brigade of infantry, one battalion of artillery, one company of engineers, detachment of signal troops, and an ambulance company. Its distribution on the march is shown. The advance cavalry, one squadron, sets out at 6 a. m. and marching at about 5 miles per hour, exclusive of halts, soon finds itself 4 or 5 miles ahead of the infantry point, and is supposed to retain about that distance, halting if necessary, when it gets too far ahead.

The advance guard begins its march at the same hour as the cavalry and proceeds at the rate of 3 miles per hour, exclusive of halts, until 6.50 a. m., when it halts 10 minutes for rest. Then it continues the march advancing 2½ miles in 50 minutes and resting then for 10 minutes of each hour. It will be noted that the walking rate is 3 miles per hour.

When the tail of the advance guard is 1 mile from camp, the head of the main body begins its march; this on the diagram would be about 7.45 a. m. The leading unit of the main body is taken as a regiment of infantry, and when the head of this regiment reaches the designated halting place, taken here at 2½ miles from camp, at 8.35 a. m., it halts for 10 minutes. The rate of advance of this first regiment is shown by a diagonal line drawn from the starting point at 7.45 a. m. to the 2½-mile line at 8.35 a. m. Through the latter point on the 2½-mile line draw a horizontal line representing the 10-minute halt; through the end of this line or at 8.45 a. m. set off downward a vertical line representing the road space occupied by the regiment in column of march, in this case about 4/5 mile. Through the tail of the column thus shown draw a diagonal rate line parallel to the first diagonal line, and where it intersects the zero line, or line of the morning camp, is the hour of departure of the second unit of the column, taken in this case as a battalion of artillery. From this diagram it would begin its march at about 8.10 a. m. and would just clear the preceding unit at the first halt. So in succession the time of departure of each unit or marching group from the morning camp can be determined. It is to be noted, in this case, that all the troops, with the exception of the advance guard halt and rest in succession at the same locality. The column, according to our drawing, is also somewhat strung out along the road at 1.20 p. m., when the last unit or artillery combat train has just reached its first halting place. The entire column is now 18 miles long.

The same troops in a closed-up column without headway between units is shown on the diagram for comparison; it is about 3 miles shorter. The closed-up column can be used when the simultaneous halt of all units at agreed-upon hours is contemplated. The latter method does not permit of much choice in the selection of halting places except for the leading unit; the others take whatever the road happens to offer, and some of the troops may find themselves at very unsuitable places, especially for the first halt of the morning. It seems better to make this first halt by successive units at a selected suitable place.

Convoys: On land the term "convoy" is usually applied to those trains by which supplies are forwarded to an army from depots or magazines in rear, and to trains bringing in supplies collected by requisition. The trains directly attached to a military force are generally sufficiently protected by the presence of troops and by train guards.

Wagon Convoys: As the difficulty of controlling and protecting a convoy increases rapidly with its length, it should not, as a rule, contain more than one hundred wagons. Such a train occupies about one mile of road space.

An officer, with such assistance as may be available, is placed in charge of the transportation. He divides the train into sections of from twenty to thirty wagons and places a noncommissioned officer or wagon master in charge of each section.

Military police are assigned to preserve order, protect property, render assistance in case of accidents, and take part in the defense. With hired or impressed transportation a strong guard is required.

A convoy marches with a distance of about 25 yards between sections, about 2 yards between wagons, and at a rate of 2 to 2½ miles an hour, including halts. The march is similar to that of a body of troops, except for breathing spells in ascending long slopes and delays to lock wheels on steep descents. Long halts are avoided. The slowest teams are placed in the lead.

Broken wagons are removed from the road, their loads being transferred to spare wagons or distributed among other wagons of the train.

Security: Security for a convoy is furnished by the escort, which, as a rule, is composed of infantry, with enough cavalry for scouting and communication, and some engineers. The proportion of cavalry varies, being greater in open than in close country.

The strength of the escort depends upon the importance and size of the train, the risk, nature of the country, length of the journey, etc. A train containing explosives requires a strong escort in order to keep the enemy from firing into it.

Convoys by Water: On interior waterways, water transportation derives its security principally from the presence of troops in the field. For protection against guerrillas and raiding parties, a shallow-draft steamboat, provided with machine guns and shelter against rifle fire, carries part of the escort and precedes the transports. Means for rapidly disembarking the escort are provided in order that hostile parties on shore may be quickly dislodged. In the case of narrow streams or canals lined with woods or other cover, it may be necessary to have the escort march on both banks and clear the country as it advances.

At sea, on the Great Lakes, and on large rivers, inlets, and estuaries, convoy escort duty is performed by the navy.

XI

Shelter in War

To maintain the efficiency of a command, the troops must have adequate shelter.

In time of peace troops in the field are generally sheltered under canvas. In local insurrections, riot or disorder, public buildings in the disturbed district may be used for sheltering the troops engaged in quelling the disturbance, when other shelter is not provided.

Private buildings are not entered without the owner's consent, except in the performance of duty.

In time of war temporary use may be made of public buildings in our own country when absolutely necessary—for example, in the care of the sick and wounded; but as long as communities or individuals offer the use of buildings, or they can be rented at reasonable rates, seizure is not resorted to unless the emergency is imperative. In enemy territory public and private buildings may be used to shelter troops and for other military purposes; but for sanitary reasons troops are seldom quartered in private buildings. When public or private buildings are to be taken for shelter, the civil authorities should be consulted and satisfactory arrangements made. Families are not removed from their dwellings if it can be avoided.

A bivouac is defined as an encampment for the night without tents or covering. The troops rest on the ground.

A camp is the ground or spot upon which tents or huts are erected for the use of an army or body of troops and is also the collection of such tents or huts, commonly arranged in an orderly manner. In military language, troops are in camp when they are sheltered under canvas, whether under shelter tents or under regular tentage.

When troops are sheltered in huts specially built or when occupying buildings in towns or villages they are said to be in cantonment.

Cantonments often develop through improvement of camps — huts or temporary buildings taking the place of tents. During a prolonged suspension of hostilities, the occupation of enemy territory, and at sieges, cantonments are advantageous, especially in cold or wet weather.

Billeting[1] is the assignment of troops to public or private buildings for quarters.

The allowance of tentage to be carried on the march is fixed in Tables of Organization. The allowances at other times is fixed by the various equipment manuals.

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[1] No soldier shall, in time of peace, be quartered in any house without the consent of the owner, nor in time of war, but in a manner to be prescribed by law. (Constitution, 3d amendment.)

Shelter in the Service of the Interior: In mobilization and concentration camps, troops are sheltered under canvas or in temporary barracks, and proper provision is made for their health, comfort, and instruction. As a rule, such camps or cantonments should fulfill the following conditions:

1. The grounds should be easily drained, naturally healthful, and large enough for depots, corrals, hospitals, etc., and the encampment of the troops without crowding, and with ample space for exercise and instruction.

2. The water supply should be excellent and abundant and not liable to contamination from any source.

3. There should be ample railroad and switching facilities and suitable arrangements for loading and unloading, as the fundamental reasons for the mobilization or concentration will be defeated if ample rail or water facilities are not available to promptly receive and dispatch troops and supplies.

4. All parts of the camp should be readily accessible by good wagon roads.

All arrangements for the accommodation and supply of the troops should be completed before their arrival by the permanent camp personnel sent ahead for the purpose. Camps are laid out so as to preserve the integrity of units, the headquarters of each being centrally or conveniently located with respect to its troops; tents are pitched and aligned, kitchens equipped, water and fuel supply arranged, latrines prepared, hospitals erected, and arrangements made for ample mail, telegraph, and telephone service. The general headquarters should be centrally located and connected by wire with the principal subordinate headquarters. Depots and storehouses are placed at railroad sidings and the hospitals near the railroad station. Trains are placed so as to interfere as little as possible with the comfort and cleanliness of the troops.

No individuals, troops, or trains of organizations temporarily present should be attached to the permanent camp personnel, if it can be avoided.

It is the function of the permanent camp personnel to operate depots, hospitals, maintain camp telephone and telegraph lines, etc. The troops temporarily present must be in constant readiness to move.

Shelter in the Theater of Operations: Tactical considerations demand greater concentration and generally control the location of the camp.

If troops are actually engaged in field operations, their equipment, including tentage, is necessarily limited to that carried on the men, on animals, and in trains. In certain instances, after proper sanitary inspection, local buildings in the theater of operations may be used to advantage in affording additional shelter to officers, enlisted men, and animals.

If the length of a halt, during the period of operations, is of some considerable duration, when practicable, additional camp equipment (baggage, tents, surplus kits, etc.) are sent up from the line of communication and temporarily placed at the disposition of organizations. In this instance every possible use is made of local buildings and temporary structures, to the end that the troops be made as comfortable as possible during the period of the halt.

Selection of Site: There is often little choice in the selection of camp sites in war. Troops may have to camp many nights on objectionable ground. Nevertheless, sanitary considerations are given all the weight possible consistent with the tactical requirements.

When tactical questions are not involved, and especially when the camp is to be occupied for some time, great care is exercised in selecting the site.

Through no fault of their own, troops occupying an unsanitary site may suffer greater losses than in the battles of a long campaign. A medical officer assists in the selection of camp sites.

The selection of camp sites while on the march or during active operations is governed by the following conditions:

1. The ground should accommodate the command with as little crowding as possible, be easily drained, and have no stagnant water within 300 yards.

2. The water supply should be sufficient, pure, and accessible.

3. There should be good roads to the camp and good interior communication.

4. Wood, grass, forage, and supplies must be at hand or obtainable.

Closely cropped turf with sandy or gravelly subsoil is best; high banks of rivers are suitable, provided no marshes are near.

In hot summer months, the ground selected should be high, free from underbrush, and shaded with trees if possible.

In cold weather ground sloping to the south, with woods to break the north winds, is desirable.

Old camp grounds and the vicinity of cemeteries are undesirable. Marshy ground and stagnant water are objectionable on account of the damp atmosphere and the annoyance and infection from mosquitoes.

Ground near the foot of a hill range generally has a damp subsoil and remains muddy for a long time.

Thick forests, dense vegetation, made ground, alluvial soil, punch-bowl depressions, inclosed ravines, and dry beds of streams are unfavorable.

Camp sites should be selected so that troops of one unit need not pass through the camp grounds of another.

As a protection against epidemics, temporary camp sites in the theater of operations should be changed every two or three weeks.

Form and Dimensions of Camps: The forms of the camp should be such as to facilitate the prompt encampment of troops after a march and their prompt departure when camp is broken. The form of camps will depend upon the tactical situation and the amount and nature of ground available.

It certain cases, particularly in one-night halts in the presence of the enemy, camps must of necessity be contracted, while in other cases, where a more extended halt is contemplated and where tactical reasons will permit, better camp sanitation may be secured, and a more comfortable arrangement made by the expansion of camp areas.

The table on page 196 is based upon the road spaces occupied by troops with units at maximum strength under the act of June 3, 1916. Infantry is assumed to march in column of squads, cavalry in column of fours, artillery and trains in single column.

The spaces differ but little from the requirements of drill regulations. On the march, after a command is straightened out on the road, elongation always takes place. In calculating the length of a column further allowance must, therefore, be made in accordance with circumstances—sometimes as much as 25 per cent.

The contracted camping spaces afford sufficient room for a one-night halt. They require that the animals and vehicles of a single troop, battery, or company be placed on the same line with the men where practicable to do so within the camp lengths above given; that the men be in double

MAXIMUM STRENGTH, ROAD SPACE, AND DIMENSIONS OF SEMIPERMANENT CAMPS

Units	Max. strength in round Nos.		Vehicles, including guns	Length of columns on march				Camping space		Con. camping space	
	Men	Ani-mals		Troops	Plus C. tns.	Plus field tns.	Division tns.	Lin. dim. yds.	Area in acres (approx-imate)	Lin. dim. yds.	Approx-imate area in acres
Divisions:											
Inf.	28,000	1[illegible],000	1,500	11.8	12.7	14.7	5.8 mi.	1370 x 1570	440	....	240
Brigades:											
Inf.	6,200	600	90	2,946	3,810	3,960 yds.		880 x 355	65	....	24
Cav.	4,800	5,200	118	5,322	5,634	6,870 yds.		910 x 425	80	....	30
Arty	4,030	3,630	398	4,770	8,154	8,925 yds.		850 x 450	80	....	30
Regiments:											
Inf.	2,060	200	27	932	1,070	1,270 yds.		280 x 355	20	160 x 225	7.5
Cav.	1,580	1,728	37	1,724	1,828	2,240 yds.		290 x 425	25	200 x 240	10
Arty.	1,309	1,173	132	1,570	2,668	2,925 yds.		270 x 450	26	200 x 240	10
Engrs.	1,098	453	27	816	1,010	1,140 yds.		270 x 318	18	160 x 150	5
Bn. Sig.	259	239	16	276 yds.	372	450 yds.		80 x 310	5	50 x 200	2
Aero Sq.	173		46	650 yds.	......	....		....	...	....	...
Tn. Pol.	332	338	2	385	......	....		80 x 341	6	50 x 250	2.5
Am. Tn.	590	1,593	327	4,505	......	....		340 x 320	23	150 x 330	10
Sp. Tn.	285	857	190	2,446	......	....		190 x 320	13	80 x 350	6
Engr. Tn.	128	318	64	1,100	......	....		85 x 280	5	50 x 200	2
Sn. Tn.	623	360	64	1,155	......	....		180 x 302	11	100 x 200	4
4 Amb. cos. 4 F,Hb. and 4 Cmp. Infir.	327	200	32	703	......	....		113 x 311	7	50 x 200	2

shelter tents (or in double row of shelter tents), and that the lines on which adjacent companies are established be separated by distances not exceeding 11 yards for infantry and other dismounted organizations, double carriage length for field artillery (except mountain), and 12 yards for cavalry and remaining mounted organizations. Latrines are placed on the opposite side of camp from company kitchens and a minimum distance of 50 yards from the men.

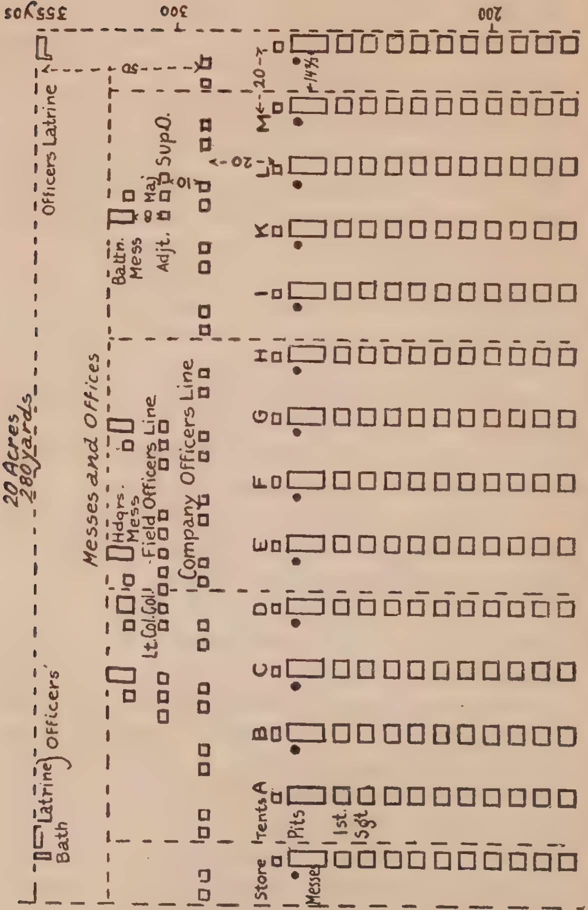
The camp areas given represent minimum requirements under favorable conditions of terrain and should be increased whenever practicable, particularly for sanitary reasons in those cases where a camp is to be occupied for more than one day.

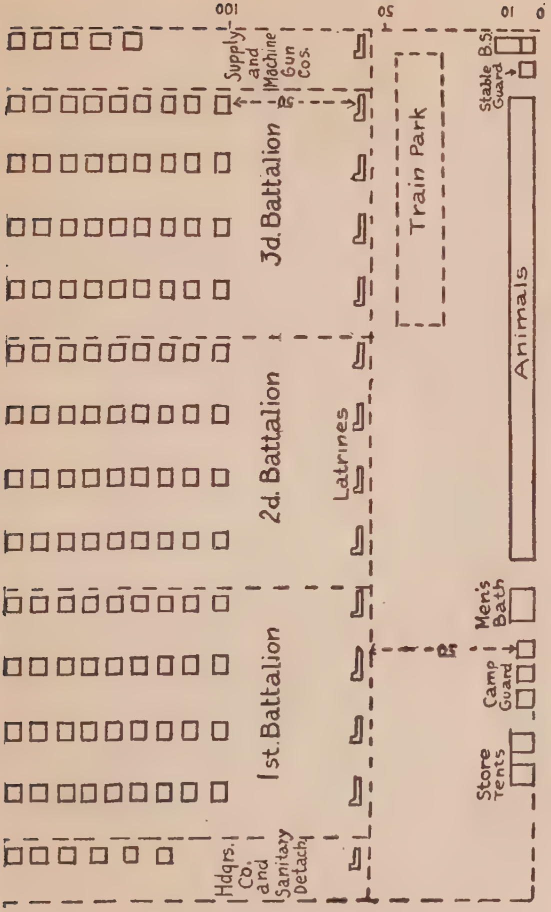
The camp of a division, excluding aero squadron, is shown on pages 206-7, 525 acres.

For approximate calculations assume 1,600 meters equal to 1 mile; 1 kilometer equal to ⅝ mile; 8 kilometers equal to 5 miles.

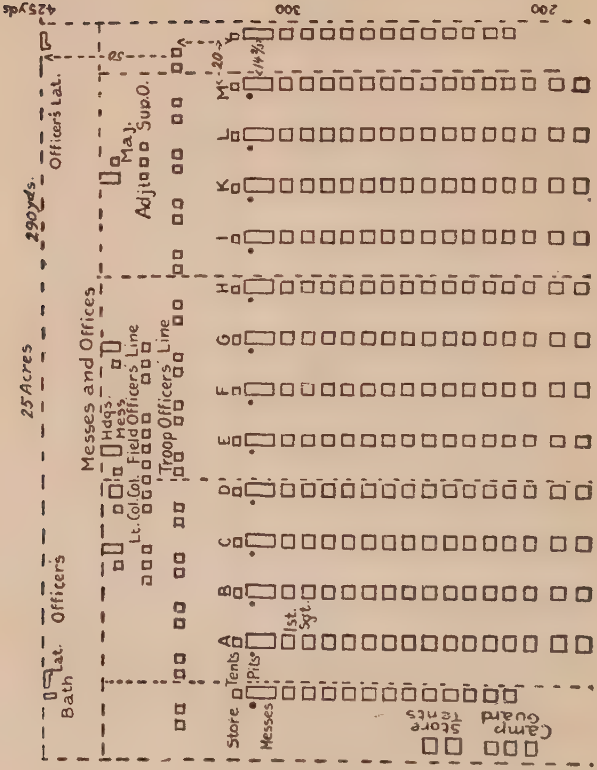
One acre is equal to 43,560 square feet or 4,840 square yards equal approximately to a square whose sides are 70 yards.

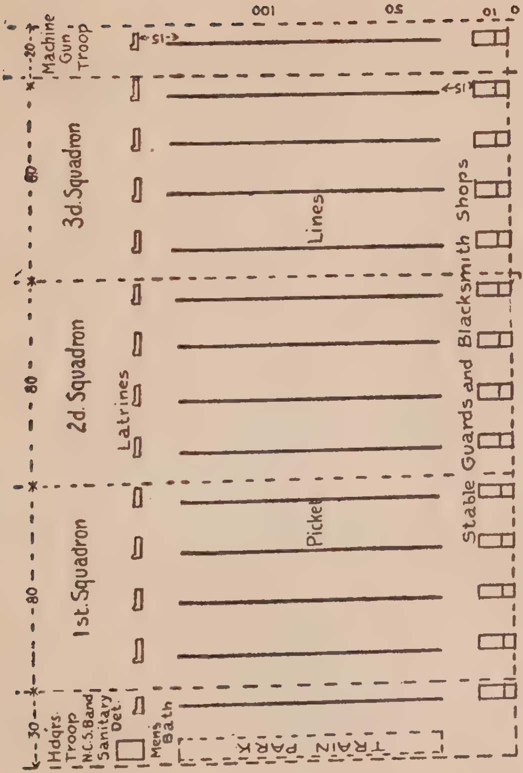
While the accompanying diagrams are of semipermanent camps using canvas as shelter, a similar arrangement is observed in more permanent camps, such as mobilization, in which the canvas is replaced by temporary structures. The distances and intervals given are the maximum to be used unless the topography of the camp site demands an increase. They should frequently


355yds
300
200
Officers Latrine
8
20
14½
20 Acres
280yards
Messes and Offices
Battn. Mess
Adjt.
Maj.
Sup.O.
Hdqrs. Mess
Field Officers Line
Company Officers Line
Lt.Col.
Latrine
Officers'
Bath
Store
Tents A
B
C
D
E
F
G
H
I
K
L
M
Pits
Messes
1st. Sgt.

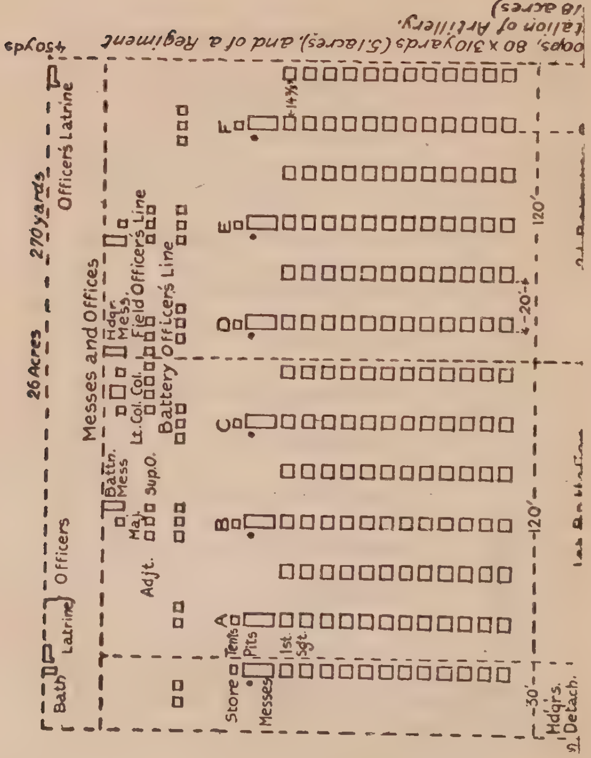


Semipermanent Camps: Camp of a Regiment of Infantry. (Maximum Strength.)

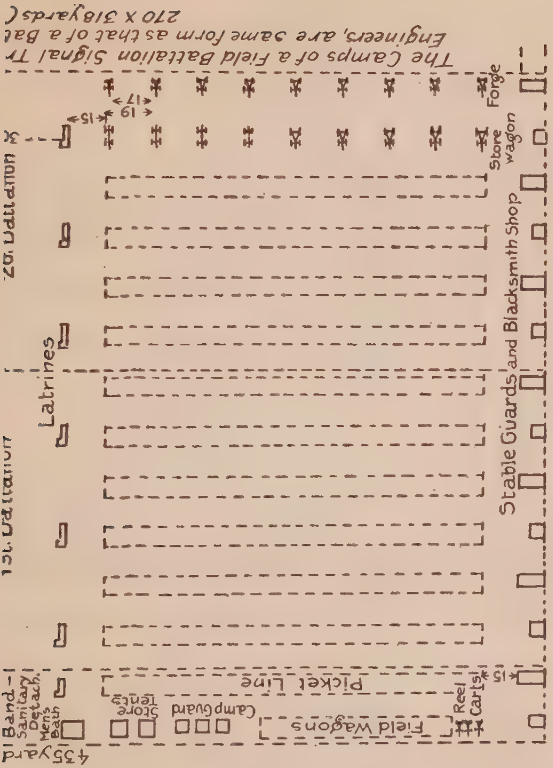

425 yds
300
200
290 yds.
25 Acres
Officers Lat.
Officers
Lat.
Bath
Messes and Offices
Maj.
Adjt.
Sup.O.
Hdqs.
Mess
Col.
Lt. Col.
Field Officers' Line
Troop Officers' Line
50
20
(14½)
M
L
K
I
H
G
F
E
D
C
B
A
1st. Sgt.
Tents
Pits
Store
Messes
Store Tents
Camp Guard



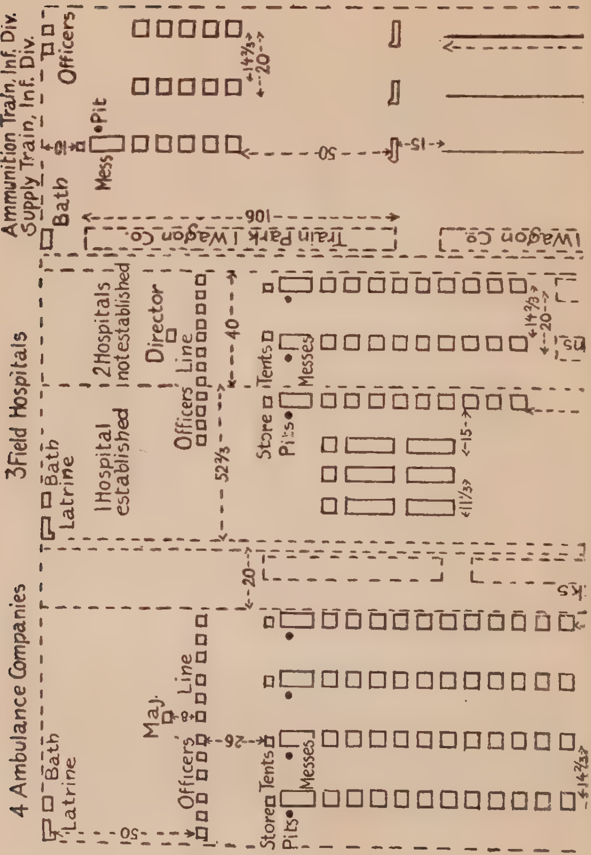
Semipermanent Camps: Camp of a Regiment of Cavalry. (Maximum Strength.)

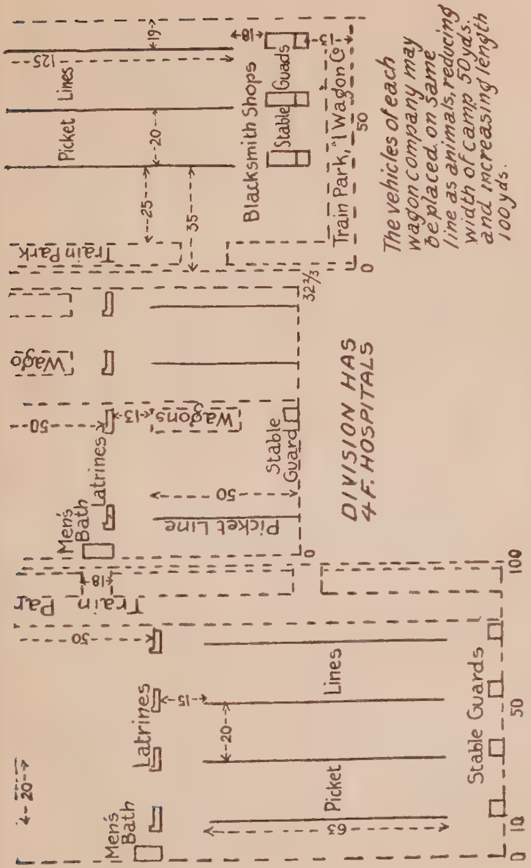


oops, 80 x 310 yards (5.1 acres), and of a Regiment
talion of Artillery.
18 acres)



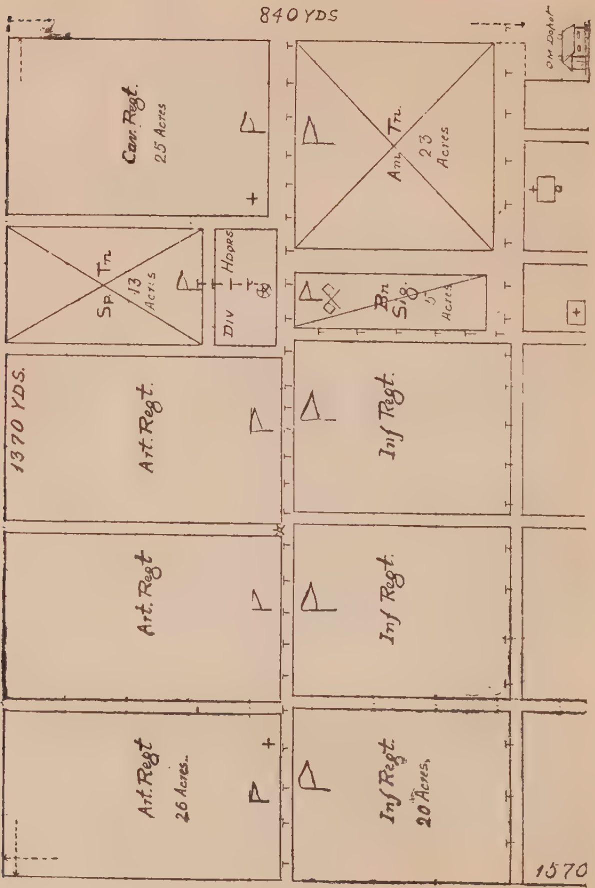
Semipermanent Camps: Camp of a Regiment of Artillery.

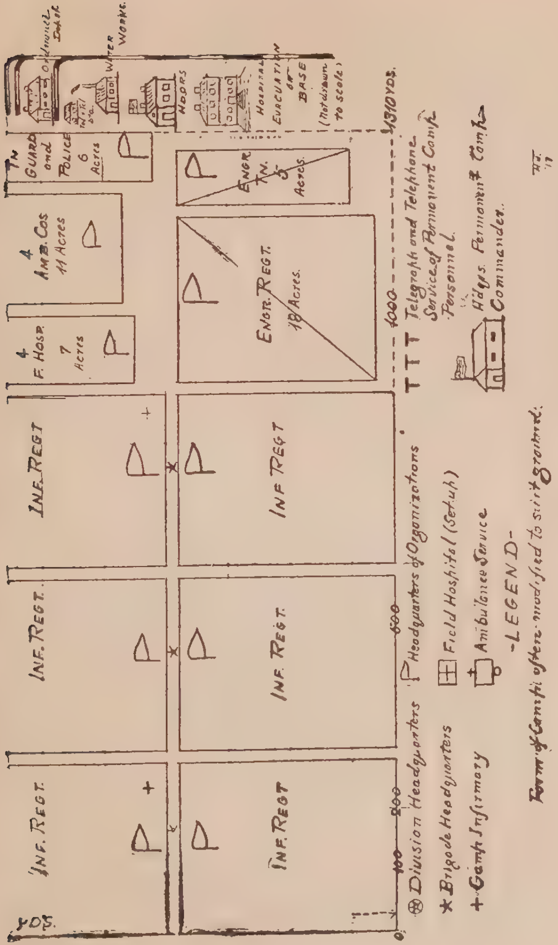

Ammunition Train, Inf. Div.
Supply Train, Inf. Div.
Officers
Bath
Mess
Pit
14⅔
20
50
15
106
Train Park 1 Wagon Co.
1 Wagon Co.
3 Field Hospitals
Bath
Latrine
1 Hospital established
2 Hospitals not established
Director
Officers' Line
40
52⅔
Store
Tents
Pits
Messes
15
11⅓
14⅔
20
4 Ambulance Companies
Bath
Latrine
Maj.
8
Officers' Line
26
50
Store
Tents
Pits
Messes
20
14⅔



SEE TABLE PAGE 196 FOR REVISED DIMENSIONS OF CAMPS OF TRAINS

Semipermanent Camps: Form of Camps of Trains.


840 YDS
1370 YDS.
1570
Cav. Regt.
25 Acres
Amn. Tn.
23 Acres
QM Depot
Sp. Tn.
13 Acres
Div Hdqrs
Bn Sig.
5 Acres
Art. Regt.
Inf Regt.
Art. Regt
Inf Regt.
Art. Regt
26 Acres
Inf Regt.
20 Acres



Semipermanent Camps: Camp of Infantry Division. (Maximum Strength.)

be reduced, as indicated below, to economize in guard and police duty, and in the labor of constructing camps.

Battalions and squadrons usually camp in column of companies. Between adjacent tents, center to center, in a row, allow 8 yards for large pyramidal (16 by 16 feet), 5 or 6 yards for small pyramidal (9 by 9 feet), and 10 yards for storage (17 feet 10 inches by 20 feet 5 inches). Between adjacent company rows, picket lines, and gun or carriage parks, center to center, 20 yards; but this distance may be reduced. From latrines 50 yards to nearest occupied tent; when a smaller camp is desired, the space between company latrines and the men's tents may be used to park carriages and animals. For picket lines and parks, allow 1 yard per animal and 4 yards per vehicle; for shelter for animals in a double row, 2½ linear feet of structure per animal will suffice. Other distances shown in diagrams may be reduced. Latrine seats are provided at the rate of one seat to about every 10 men; shower heads at one to every 50 to 100 men, depending upon water pressure; one bathhouse for officers and one for men (or a single bathhouse suitably partitioned) in each regiment or separate battalion; water spigots at the rate of one for each mess.

No fixed type of camp is prescribed for use in the theater of operations. In the presence of the enemy, camps and bivouacs must be modified to afford the best protection for men, animals, and trains. This will frequently necessitate the juxtaposition of shelter for the men and picket lines for the animals.

Care of Troops: Lack of sufficient rest renders troops unfit for hard work and diminishes their power of resisting disease. Therefore commanders should secure for the troops, whenever possible, their accustomed rest.

The rules of sanitation are enforced.

Men should not lie on damp ground. In temporary camps and in bivouac they raise their beds if suitable material, such as straw, leaves, or boughs can be obtained, or use their ponchos or slickers. In cold weather and when fuel is plentiful the ground may be warmed by fires, the men making their beds after raking away the ashes.

When troops are to remain in camp for some time all underbrush is cleared away and the camp made as comfortable as possible. Watering troughs, shelter in cold weather, and shade in hot, are provided for the animals, if practicable.

In camps of some duration guard and other routine duties follow closely the custom in garrison. The watering, feeding, and grooming of animals take place at regular hours and under the supervision of officers.

The camp is policed daily after breakfast and all refuse matter burned.

Tent walls are raised and the bedding and clothing aired daily, weather permitting.

Arms and personal equipments are kept in the tents of the men. In the cavalry, horse equipments are also usually kept in the tents, but in camps of some duration they may be placed on racks outside and covered with slickers. In the artillery, horse equipments and harness are placed on the poles of the carriages and covered with paulins.

The water supply is carefully guarded. When several commands are encamped along the same stream this matter is regulated by the senior officer.

If the stream is small, the water supply may be increased by building dams. Small springs may be dug out and lined with stone, brick, or empty barrels. Surface drainage is kept off by a curb of clay.

When sterilized water is not provided, or when there is doubt as to the purity of the water, it is boiled 20 minutes, then cooled and aerated.

Latrines for the men are always located on the opposite side of the camp from the kitchens, generally one for each company unit and one for the officers of a battalion or squadron. They are so placed that the drainage or overflow cannot pollute the water supply or camp grounds.

When the camp is for one night only, straddle trenches suffice. In camp of longer duration, and when it is not possible to provide latrine boxes, as for permanent camps, deeper trenches should be dug. These may be used as straddle trenches or a seat improvised. When open trenches are used the excrement must be kept covered at all times with a layer earth. In more permanent camps the trenches are not over 2 feet wide, 6 feet deep, and 12 feet long, and suitably screened. Seats with lids are provided and covered to the ground to keep flies from reaching the deposits, urinal troughs discharging into the trenches are provided. Each day the latrine boxes are thoroughly cleaned, outside by scrubbing and inside by applying when necessary a coat of oil or whitewash. The pit is burned out daily with approximately 1 gallon oil and 15 pounds straw. When filled to within 2 feet of the surface, such latrines are discarded, filled with earth, and their position marked. All latrines and kitchen pits are filled in before the march is resumed. In permanent camps and cantonments, urine tubs may be placed in the company streets at night and emptied after reveille.

SHELTER DURING TRENCH WARFARE AND SIEGES

The present phase of the European War along the western front is a siege operation on a large scale. It is to a certain extent due to the peculiar conditions existing there but also represents the development of and the increased necessity for the use of cover in modern warfare. These conditions are likely to be repeated in future campaigns where the opposing forces are about equally matched. The conditions require that the supporting and reserve troops be close at hand to reenforce the fighting line with great promptness when the occasion requires, and also that they shall be well covered and concealed from the most effective artillery fire that has ever been brought into play. The troops in trench warfare are therefore sheltered first in the trenches themselves, then in dugouts and recesses offering various degrees of protection, then in huts and cantonments well hidden in forests or behind the crests of ridges in positions not easily discoverable from the front or from airplane observation.

In the trenches themselves the men are sheltered in dugouts usually with a bombproof cover of about three feet of earth and with room for three to eight men. Some of these dugouts are in rear of the firing trench connected directly with it. Others are reached by a more or less intricate system of zigzag communication trenches. In trenches where the ground water level makes it necessary to construct them almost entirely above the surface of the ground, shelters for the troops are built in the parapet embankment.

In order to endure the intensive bombardments that now commonly precede an offensive advance by the infantry, and that may last for several days or even weeks, it is necessary for the troops of the firing lines and supports to retire deeper into the ground, and dugouts are therefore built as much as 30 feet deep, reached by ramps or staircase, with overhead protection against the heaviest artillery, and providing accommodations for rest and sleep for large numbers of men.

Back of the trenches the troops in general reserve would be largely quartered in villages in a populous region like Europe. Where these did not exist, or are insufficient, huts should be constructed of any available material, such as poles and limbs of trees, brush, planks, tar paper, galvanized iron with straw-thatch roofs, or roofs of tar paper or paulins. They should be improved and made more waterproof and comfortable as time permits. If they are to be occupied during the cold or wet season, fireplaces and chimneys should be provided and the walls should be made wind proof by plastering with mud or otherwise. The log hut of pioneer days, with cracks "chinked" and daubed with mud or mortar, makes a comfortable shelter quickly constructed. Concealment, even far in rear of the lines and even cover against possible artillery fire may be necessary.

Personnel of the Trenches: The number of men assigned to the constant occupancy of the first-line trenches should be reduced to the very least required to do the work. This is due to the increased density and effectiveness of rifle fire at close and medium ranges, the destructive effect of shell and shrapnel and the infrequency of daylight attacks on intrenched positions. Machine guns and magazine rifles enable a few men to deliver a fire of great density, sufficient at medium ranges to inflict severe loss on the attacking forces. Shell and shrapnel directed at the firing trench make it necessary for the defenders of that trench to be well covered in dugouts and splinter proof shelters, and until the attackers have come so close that the hostile artillery cannot fire safely into the firing trench it is safer and more economical to hold out large supports and to keep them in cover trenches a short distance in rear. When the attackers come close, the supports are moved up into the firing trench and the decisive action begun.

The reserves are used as heretofore to influence the course of the action through counter-attacks and to cover withdrawals.

To guard against sickness due to exposure and the crowded and often unventilated and poorly heated quarters in the bombproofs and dugouts great care must be taken in regard to the water, food, and sanitation of the men.

The trenches are nearly always wet and muddy during the winter or in rainy spells and in many places are part of the time more or less filled with water. Experience in Europe has shown the desirability and even necessity of providing men in the trenches with the following outfit of warm clothing for winter service: one jersey or sweater, one pair of lined gloves, one flannel or woolen stomach band, one muffler or woolen head-dress, two flannel shirts, two flannel drawers and two pairs of woolen socks. A type of special trench boots with wooden soles and bootlegs extending above the knee has also been adopted. These boots are to be worn over the shoes.

Men in the trenches are relieved at frequent intervals if circumstances permit. It seems desirable to keep them in the trenches proper only from four to six days, and during this time they perform duty in regular turn as sentries in the firing trench and as supports in the splinter proofs or the cover trenches. In other words, the firing line and supports are merged and actually live in the trenches and their accessories. From four to six days are then spent in the reserves in the villages or in extemporized huts at convenient places in rear. This distance in rear seems to be from 2 to 5 kilometers, and the camp should be behind a crest if possible. When practicable these troops are then given a period of complete rest four to six days well to the rear out of sight and perhaps sound of battle, where they have a chance to bathe, clean their clothes, bedding, etc., and freshen up for another turn on the advanced line.

The trench guards are relieved daily just after dark, at which time warm food is brought up as near as possible in the company traveling kitchens. Great care should be taken to provide good food and at least one full hot meal per day.

Stoves in the trenches, wooden gratings in the bottoms, comfortable sleeping quarters, will all tend to keep the men in better physical condition and toward securing more efficient service.

Some details as to the common practice in the European War where trench warfare has been in progress for a considerable time in certain sections are given in the following descriptions of shelters and arrangements made for the comfort and health of the soldiers.

Dugouts: Dugouts are frequently built in the ground between the firing trench and the back or support trenches and arranged to open into the latter by means of galleries and steps.

The floors are five or six feet below the bottom of the back trench. At the roof of the dugouts heavy horizontal timbers are set in the solid ground to prevent possible caving in of the earth and to increase the overhead protection.

The location of dugouts above described is somewhat open to criticism. In case of sudden attack the occupants of one of these dugouts would have to run to the rear through the gallery, into the back trench, along the latter for some distance and then turn a corner before they could enter the short trench leading forward to the firing trench or make any use of their firearms against an enemy coming from the firing trench. It would seem to be better to place the dugout back of the rear wall of the back trench with a perfectly straight gallery leading forward to the junction of the back trench and the short communicating trench; then the occupants could simply come out of the dugout and open fire while advancing straight to the front.

Many of them have wooden box ventilators leading from the open air down through the solid earth roof.

Where the roofs have to be constructed loose earth is generally preferred to packed or rammed earth. In the most usual type corrugated iron is placed on the roof beams, then a few inches of loose earth, a layer of sandbag stretchers, more loose earth, a layer of sandbag headers, a layer of bricks, sandbags, etc. The object of the bricks or other hard material in a similar position is to explode shell before they shall have penetrated too far into the roof.

It is found important in all cases to put paulins or waterproof sheets over the roof of the dugouts. Without this, even in the case of dugouts far below ground the rain will finally soak through and when the water has once found a path there is constant trouble.

In breastworks constructed entirely above ground a large recess is formed by cutting away the lower half of the parapet. The roof of this recess rests on two rows of posts which divide it into three equal parts each of which is just large enough to accommodate one bunk with a narrow footing along it to give room for a man to get in and out. The floor is flush with the firing step which is the original ground level.

Dugouts should have a bench of solid earth along one side to provide a place for the bunk and a refuge from water in case the dugout is flooded.

Revetments: To prevent the destruction of trenches and underground shelters by the elements and hard usage substantial and durable revetments must be constructed. The best kind is the brushwood hurdle anchored in place by lashings of wire to stout stakes or pickets firmly driven into the solid ground. The revetment should be as high as the walls of the trench so that the earth will not crumble at the upper edge of the excavation and run into the trench.

Hurdles are generally made in lengths about 2 meters long, 1 meter high and 2 or 3 inches thick.

A badly crumbled trench can be repaired by the use of hurdles. Other excellent materials for revetments are fascines and planks. Fascines are used especially for firing benches and steps. Fascines should not be made longer than about 100 inches nor thicker than about 10 inches on account of the difficulty of carrying larger ones through narrow trenchways.

A form of revetment extensively used on account of its convenience is woven-wire mesh behind which are placed bundles of brush or small limbs.

Drainage: Proper drainage is indispensable to the preservation of the earthworks and of the health of the men. Accumulations of water would soon convert the walls into crumbling masses of earth and the bottom into sticky mud that could never be kept in a sanitary condition.

The best system is to conduct the water from the trench to lower ground, but this is not always possible. A system much used is that of waste wells in the lowest portions of the trenches; these wells may be 1 meter deep and 1 meter across filled with broken tile and covered with a wooden grating.

Drainage gutters along the rear of the bottom of the trench lead the water to these wells. These gutters should be covered with inclined boards.

If the trench is dried by scooping out the water and mud, care must be taken not to deepen it so that the firing steps are too high or too inconvenient to reach. The mud must be thrown over and beyond the parapet; if not the liquid mud will run back into the trench.

Always have a berm or free space on the edge of the trench so that the edge does not have to support the weight of the earth.

In case of considerable water in the trenches arrange a footing of fascines, poles, or planks resting on sills. Broken tile, loose or in sacks, is often useful.

Pumps are practicable only when used intelligently. If the pump is set directly in the slimy ooze it will immediately clog up and become useless.

In time of rain it is necessary to work constantly at the drainage of the trench to prevent the earth from liquefying completely. Fight especially against the inflow of water.

Latrines: Numerous latrines with designated locations are essential and they should have plenty of room so that they may serve their purpose. Regular inspections should be made in addition to those by the sanitary personnel. A liberal use of quicklime and frequent change in the location of latrines should be insisted upon.

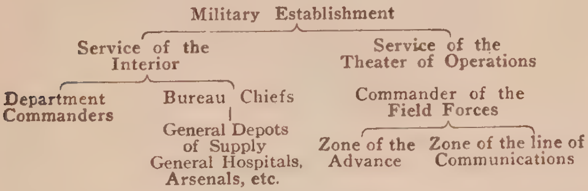
Heating Trenches and Shelters: For occupancy during cold and wet weather all the available stoves of the command should be used and they should be placed in the most advanced positions where the hardships of the service are the greatest. Braziers or sheet iron receptacles pierced with holes make serviceable stoves; hence old buckets may be used. Stoves can be made also out of tiles, brick, chunks of clay, stones, etc. To retain the heat a separate heating drum is desirable. A chimney or flue to provide proper draft is necessary. Wood or charcoal would be the probable fuel used.

Billets: Billeting is practically unknown in our service though with armies of a size required by modern war it would doubtless be resorted to in thickly settled communities.

XII

Administration in War

The activities of the military establishment in time of war is illustrated by the following diagrammatic figures:

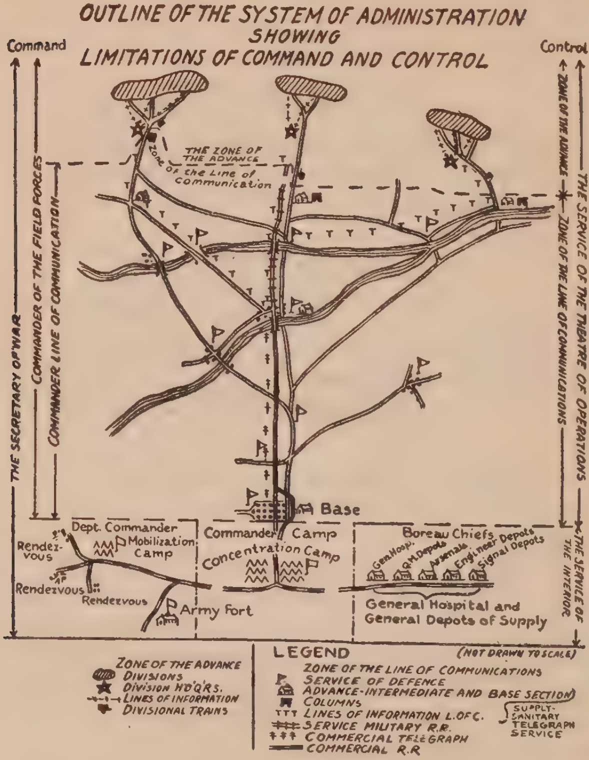

Military Establishment
Service of the Interior
Service of the Theater of Operations
Department Commanders
Bureau Chiefs
General Depots of Supply
General Hospitals, Arsenals, etc.
Commander of the Field Forces
Zone of the Advance
Zone of the line of Communications

The service of the interior functions in both peace and war; that of the theater of operations in war only.

The Service of the Interior: The service of the interior, in time of war, is charged with supplying the commander of the field forces with the means to accomplish his mission. It is conducted by the bureau chiefs, the department commanders, aided often by commanders of concentration camps and ports of embarkation. The several agencies are directed and coordinated by the Secretary of War through the Chief of Staff.

The scope of duties is about as follows:

Bureau Chiefs: They are the advisers of the Secretary of War and the Chief of Staff in matters relating to the operations of their respective departments or corps throughout the entire military establishment. Full information of the plans



OUTLINE OF THE SYSTEM OF ADMINISTRATION SHOWING LIMITATIONS OF COMMAND AND CONTROL of the field forces should be sent to them and they are then required to recommend the measures that will insure the carrying out of those plans so far as concerns their respective departments or corps.

They control directly and are responsible for the efficient operation of the general depots of supply, general hospitals, arsenals, and other military establishments placed under their orders.

They are charged with the accumulation of the necessary supplies and matériel and with forwarding the same, in accordance with regulations, to the point where they come under the control of the department commander, the commander of the field forces, the commander of the port of embarkation, and in certain instances the commander of a concentration camp.

They formulate estimates for the necessary appropriations to carry on the operations of their respective departments or corps.

Department Commander: He is responsible for the recruitment, training, and equipment of all military forces not specially excepted within the limits of his department, and for their mobilization and dispatch to concentration camps.

Mobilization and Concentration: A mobilization camp is a place, in the territory from which the troops are drawn, where they are assembled to be raised to maximum strength, equipped, and prepared for service.

A concentration camp is a place near the scene of intended operations or near an embarkation point, where troops are assembled for immediate use against the enemy or for transport to an oversea theater of operations.

Concentration camps are intended to be used also for assembling and training troops in large units, not less than a division. Concentration camps should be selected and fully equipped in time of peace and they should be located in strategic or defensive areas with due regard to convenience of assembly, suitability for training and maneuvering purposes, and all the uses expected to be made of such camps in peace and war. The war destination of troops sent to occupy them should be well considered and their location should fit the adopted war plans of any given frontier or section of our coast.

Port of Embarkation: The duties of the commander of the port of embarkation are as follows:

(a) To arrange camps for the troops at or near the port of embarkation.

(b) To accumulate supplies for the maintenance of the expeditionary force while at the port of embarkation and until its arrival at the port of debarkation.

(c) To accumulate and ship the necessary supplies for the maintenance of the troops at the oversea base pending the organization of the supply services in the theater of operations.

(d) To make all detailed arrangements for the prompt detraining of troops and material and for their subsequent embarkation.

(e) To see that the ships furnished him by the Quartermaster Corps are properly fitted out for use as transports.

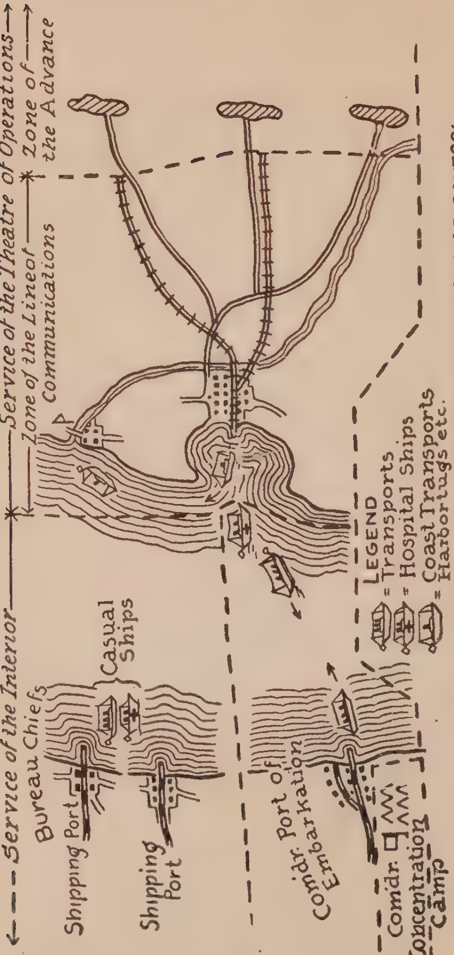
(f) To operate and maintain the military shipping and traffic between his port and the oversea base through a superintendent of transport service, who is a member of his staff.

(g) To command all administrative groups assigned to the port of embarkation and to be directly responsible to the War Department for the efficient and economical direction of their operations.

The commander of the port of embarkation, his staff and personnel, are not subject to the orders of the commander of the troops at the concentration camp nor the latter commander to the orders of the former.

The commander of the port of embarkation prepares the schedules for the embarkation of troops, matériel and supplies on transports, and has charge of such embarkation. The commander of the camp issues the orders necessary to carry out these schedules and details a staff officer to assist the commander of the port of embarkation during the loading. Under all conditions these schedules will be made only after consultation with the superior commander of the troops to be embarked.

When a landing or disembarkation in the face of opposition is anticipated, the distribution and plan of embarkation will be made to suit the tactical requirements of the situation, and in case



OVER SEA OPERATIONS-SHOWING LIMITATIONS OF CONTROL of a difference of opinion the final decision will rest with the commander of the troops. When no opposition to landing is expected, the final decision will rest with the commander of the port of embarkation.

Oversea Departments: The department commander, in addition to his functions as described in the Service of the Interior, is also charged with the defense of the oversea department, and directs all military operations within its limits. Such regulations as are applicable relating to the control and command of the commander of the field forces in the theater of operations are, in time of war, vested in the commander of an oversea department.

Embarkation: When it is considered that a full strength division of about 28,000 men, 12,000 animals and 1,500 vehicles will require shipping of nearly 250,000 gross tons, or 50 transports of 5,000 tons each, it can readily be seen that the embarkation of a division is an operation of considerable magnitude and complexity and will require the most careful foresight and preliminary arrangements to secure a rapid and orderly movement from the camps to the wharves and on board the ships.

The order of loading supplies and equipment that may be loaded ahead of the troops must be scientifically planned, always keeping in mind the conditions of disembarkation on the hostile shores oversea, and having affairs arranged so that the articles that are needed first can be unloaded first.

TRANSPORTATION BY SEA.—CONDENSED LOADING TABLES.—ORGANIZATIONS AS PER TENTATIVE TABLES OF ORGANIZATION, 1916

Tonnage Required Based on Gross Tons, 4 per Man, 9 per Animal, and 10 per Vehicle

Organizations	Officers	Men	Animals	Vehicles	Tonnage required
INFANTRY					
Regiment (complete)	56	2,002	200	27	10,302
Battalion	14	600	3	..	2,483
Detachment from Hdqrs. Co.	..	3	3	..	39
Detachment from Supply Co.	..	8	29	7	363
Sanitary detail	1	10	3	..	71
Total	15	621	38	7	2,956
Company in battalion	3	150	..	..	612
CAVALRY					
Regiment (complete) [1] includes 2 vets.	59 [1]	1,520	1,728	37	22,238
Squadron	14	420	435	..	5,651
Detachment from Hdqrs. Tr.	..	5	6	..	74
Detachment from Supply Tr.	..	11	41	10	513
Sanitary detail	1	10	11	..	143
Total	15	446	493	10	6,381
Troop in squadron	3	105	108	..	1,404
FIELD ARTILLERY					
Regiment (complete) [2] includes 2 vets.	47 [2]	1,290	1,204	132	17,504
Battalion	17	570	486	54	7,262
Detachment from Hdqrs. Co.	..	17	18	1	240
Detachment from Supply Co.	..	10	37	9	463
Sanitary detail	1	10	11	..	143
Total	18	607	552	64	8,108
ENGINEERS					
Regiment (complete)	37	1,061	453	27	8,739
Battalion as per tables of organization	14	499	198	11	3,944
Sp. Sgt. and 11 wagoners from Regt. Hdqrs.	..	12	1	..	57
Sanitary detail	1	10	5	..	89
Total	15	521	204	11	4,090
Company as per tables of organization	4	164	60	3	1,242
Wagoners from Regt. Hdqrs.	..	3	..	..	12
Total	4	167	60	3	1,254

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[1] Add 1 vet. if squadron goes on detached service.

[2] Add 1 vet. if battalion goes on detached service.

NOTE: With above tonnage basis each wagon with its wagoner and four animals will require 50 gross tons on a ship.

ILLUSTRATION OF SCHEDULE FOR LOADING SHIPS

Ship	Gross tons	Tons used	Organizations, Detailed assignments	Officers	Men	Animals	Vehicles
Esparta..	3,297	3,518	1st Bn. 24th Inf.	14	600	3	..
			Det. Hdqrs. Co.	...	3	3	..
			Det. Supply Co.	...	7	25	6
			Sanitary Detail	1	10	3	..
			1 Co. 2d Bn.....	3	150	..	..
			Total......	18	770	34	6
Nachochee....	2,680	2,344	2d Bn. 24th Inf. Less 1 Co.	11	450	3	..
			Det. Hdqrs. Co.	...	3	3	..
			Det. Supply Co.	...	8	29	7
			Sanitary Detail	1	10	3	..
			Total......	12	471	38	7
Meteor...	2,301	2,344	3d Bn. 24th Inf. Less 1 Co. plus details as for 2d Bn.........	12	471	38	7
Barracuta	2,152	2,061	24th Inf. less 1 Off., 1 Ord. and 3 mts. to Det. Hdqrs., less 3 Bn. Hdqrs. and 11 Cos.........	13	289	87	7
		10,267	Total of 24th Infantry	55	2,001	197	27

An unsystematic order of loading may bring about disaster. After the supplies have been put aboard (and there should be about two months' supplies) the troops, animals, and their vehicles should be embarked as rapidly as possible. Vehicles and animals take a good while to load, whereas the troops can march on in a few minutes. The arrangement of the transports at the piers is important in order to prevent congestion and the crowding of men and animals on the outer ends. Ships carrying infantry alone are preferably held at the outer or sea ends and those carrying many animals and vehicles held in compact grouping near the shore ends.

There is no prescribed form of field order for embarking a command. A form may be devised, however, somewhat analogous to the usual field for moving troops. Such an order might well state the purpose of the commander to embark, giving time, place, location of each ship, the detailed assignment of troops to each vessel, commanders of these ship detachments, their duties, etc. Much of this may be given in a tabulated statement or in diagrammatic form, showing the hour at which each transport reaches berth, when it begins to load, when it completes loading and moves out for another to take its place at the wharf.

All this must be handled systematically. The question of maintaining order and protecting property at the camp, during the progress of the embarkation, and at the wharves must be considered and orders given to establish the proper guards and responsible officers. The routes of march from camps to the wharves must be fixed so that there shall be no crossing of routes, no congestion, and no unnecessary confusion. It is well, if practicable, to establish rendezvous points near the piers for each ship detachment from which it can be called on short notice by the officer regulating the loading at each pier.

Orders must indicate the disposition to be made of troop property not to be carried on the transports, but to be left behind in charge of the local depot quartermaster or the commander of the port of embarkation.

As in all field orders the location of the commanding officer of the expedition should be made known to all, so that messages may surely reach him at any time.

XIII

The Service of the Theater of Operations

In the theater of operations the functions of the War Department and of the various commanders are, in general, as follows:

The War Department designates the commander of the field forces, assigns him a definite mission, prescribes the zone under his command, and supplies him with the means necessary to the accomplishment of his mission.

The commander of the field forces exercises supreme authority over all military and administrative matters within the zone assigned him, organizing the means placed at his disposal so as to insure efficiency, and directing and controlling all operations necessary to the accomplishment of his mission.

The commander of the line of communications is responsible to the commander of the field forces for the efficient operation and defense of the line of communications and directs and controls all administrative and staff services attached thereto.

Headquarters and Staffs: All military units larger than a company have headquarters and staffs. The headquarters of squadrons, battalions, and brigades have no administrative functions. The headquarters of an independent detachment has for the time being administrative functions and during such periods is temporarily assigned an administrative staff.

The commander of an army concerns himself with only the broad questions of strategy and military policy. He assigns general missions to his subordinate commanders and leaves them to work out the necessary details. On this account he is assigned only such administrative and technical staff as he may require for these broad functions.

The staff functions of the headquarters of units larger than a brigade may be separated into two groups, i. e., (1) general staff group; and (2) a technical and administrative group—record, inspection, law, supply, sanitary, engineer, ordnance, and signal.

The General Staff: The Chief of Staff is the mouthpiece of his commander and should enjoy his complete confidence and a considerable degree of independence in the performance of his duties. He controls and coordinates the operations of the troops and all administrative and technical services under the orders of his commander. He is provided with such assistants as are necessary. To each such assistant is particularly assigned the work of one or more of the three general divisions of general staff work, viz.:

The first or combat section concerns itself with orders, movements, and dispositions of the forces; combats, detachments; war diaries.

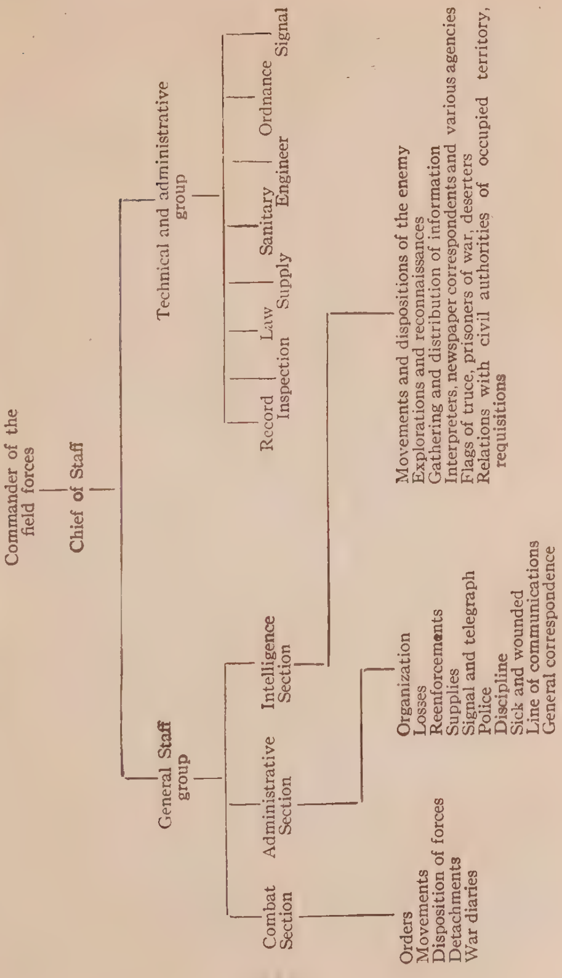
The second or administrative section concerns itself with organization, losses, reenforcements, police and discipline; questions of supplies of all kinds; signal and telegraph service; evacuation and care of sick and wounded; relations with the line of communications and all general correspondence.

The third or intelligence section concerns itself with the movements and dispositions of the enemy, including exploration, reconnaissance, and the gathering and distribution of information; interpreters, newspaper correspondents, and various agents; relations with the enemy, flags of truce, deserters, and prisoners of war; relations with the civil authorities of the occupied territory, requisitions, etc.

Technical and Administrative Staff: This includes the representative of the various staff corps and departments who may be assigned to the headquarters. These officers perform the duties appropriate to their office under the instructions of their commander. During the period of grand tactical operations with commands larger than a division and when a line of communication is in operation, their functions are advisory. Upon completion of the grand tactical operations and upon the discontinuance of an organized line of communications, or if no line of communications has been organized, these staff officers assume a more immediate control of their respective staff personnel, depots, hospitals, etc. (See accompanying diagram.)

The functions of the technical and administrative staff of a division are so intimately connected

DIAGRAM INDICATING A PROPER ORGANIZATION


Commander of the field forces
Chief of Staff
General Staff group
Combat Section
Administrative Section
Intelligence Section
Orders
Movements
Disposition of forces
Detachments
War diaries
Organization
Losses
Reenforcements
Supplies
Signal and telegraph
Police
Discipline
Sick and wounded
Line of communications
General correspondence
Movements and dispositions of the enemy
Explorations and reconnaissances
Gathering and distribution of information
Interpreters, newspaper correspondents and various agencies
Flags of truce, prisoners of war, deserters
Relations with civil authorities of occupied territory, requisitions
Technical and administrative group
Record
Inspection
Law
Supply
Sanitary
Engineer
Ordnance
Signal

with the maintenance of the division as to preclude the separation of any of its personnel for any extended period of time from its headquarters. These staff officers are the technical advisers of the division commander, and control directly the operation of such portions of their respective corps personnel as may be placed under their immediate orders.

The Commander of the Line of Communications: This commander reports directly to the commander of the field forces.

The mission of the tactical units and administrative groups assigned to a line of communications is to relieve the combatant field force, as far as possible, from every consideration except that of defeating the enemy.

It is necessary that the commander of the field forces be relieved from the consideration of details and thus be free to consider the broad lines of action to be followed by his command.

A line of communications is not organized when a force can safely occupy a territory without military operations of an extensive character. In this case administration and supply naturally and properly follow the same general principles as with troops in the service of the interior.

Zone of the Advance: The division is the typical administrative unit for a force composed of all arms. Smaller independent units model their administrative organization somewhat on that of the division. The division, as we know, consists typically of—

Headquarters and staff;
Three brigades of infantry = 9 regiments;
One brigade of field artillery = 3 regiments;
One regiment of cavalry;
One regiment of engineers;
One field battalion signal corps;
One aero squadron;
Divisional trains.

To the division alone are regularly attached ammunition, supply, sanitary, and engineer trains. Should army corps troops be attached to a division for their supply and the care of their sick and wounded, the trains of the division must be correspondingly increased. When army corps troops are organized into a separate brigade, the administration follows the model of the division and the necessary ammunition, supply, and sanitary trains are organized in and assigned to the brigade.

Troops in action must be able to concentrate their attention on the task of defeating the enemy, and must not have to concern themselves with questions of supply or evacuation of sick and wounded. The initiative in these matters must come from the troops and services in rear. Normal routine requirements are automatically replaced without requisitions; this refers particularly to furnishing rations, grain, ammunition, and sanitary supplies.

It is the function of the line of communications to extend its operations forward to make contact with the divisions in the zone of the advance so that the divisions do not have to look behind them. The line of communications may be a greater or less distance in rear of the divisions depending upon tactical and strategic reasons and sometimes connection may be temporarily lost and the division compelled to get along with its reserve supplies or to live off the country.

The administrative services of the division should be always able to move with the division and must not be hampered by the care of supplies not carried by the divisional train nor by the prolonged care of the sick and wounded. The equipment of the sanitary train is expected to provide only immediate and temporary service pending the early evacuation of the sick and wounded to the line of communications. This principle may be subject to modification when the division makes a stop of long duration, for example, of several weeks in order to occupy hostile territory, establish military government, or to collect supplies from the country. The division administrative services may then undertake duties similar to those of the line of communications for the time being.

Transportation: The mobile supplies and materials continuously required by a division are carried in vehicles grouped into the following trains: Combat, field, ammunition, supply, sanitary, and engineer.

Their function is to keep the units to which they are attached at all times ready for action without hampering their movements. This duty demands foresight, careful orders in regard to future operations, and good judgment on the part of the higher commanders. The officers in command of the trains are in positions of great responsibility and must be ready to make any sacrifice to insure the arrival of supplies at the place and time designated by the commander.

Trains are classified as follows:

(a) Those belonging to organizations smaller than a brigade and designated as combat and field trains, respectively;

(b) Those assigned to divisions and designated ammunition, supply, sanitary, and engineeer trains, respectively.

When it becomes necessary in special cases to establish a connecting link between the division trains and the termini of the regular rail or water transportation systems of the country, there are organized ammunition, supply, sanitary, and engineer columns, which are attached to and belong to the advance section of the line of communications. These columns may consist of wagon, motor, or tractor transport.

Combat Trains: Combat trains include all personnel, vehicles and animals attached to organizations for transporting ammunition reserve and special equipment required during combat, including the mule or cart carrying sanitary first-aid equipment. To them also are attached those vehicles required for the technical service of engineers and signal troops.

Combat trains remain at all times with the unit to which attached and follow it into action. In the cavalry and field artillery it may be advisable to temporarily separate combat trains from the troops.

Field Trains: Field trains include all personnel, vehicles, and animals attached to organizations or headquarters for the transportation of the authorized allowance of baggage, rations, and grain, and include rolling kitchens, if supplied. Wagons of sutlers, correspondents, etc., accompanying a field force by proper authority are assigned to the field train of the organization to which their owners are attached. On the march the headquarters wagons of brigades and divisions are generally attached to some regimental field train.

Field trains are assigned to regiments and independent battalions and are habitually divided into two sections: (1) A baggage section carrying baggage; and (2) a ration section carrying rations and grain exclusively, and including rolling kitchens, if supplied.

For transportation of baggage each organization is assigned its proportionate space on the vehicles of the baggage section.

Divisional Trains: The ammunition train includes all vehicles, animals, and personnel employed in transporting the divisional artillery and infantry ammunition reserve, or in bringing up the same from the refilling point to combat trains of organizations. (See Ammunition Service, p. 251.)

The supply train includes all vehicles, animals, and personnel employed in transporting the divisional ration and grain reserve, or in bringing up the same from the refilling point to the distributing point. To it may also be attached herds of beef cattle, remounts, vehicles carrying reserve quartermaster supplies, and reserve transportation. (See Supply Service, p. 242.)

The sanitary train includes all vehicles, animals, personnel, and reserve sanitary material, not attached to organizations, employed in collecting and caring for the sick and wounded of the division pending their evacuation by the line of communication. (See Sanitary Service, p. 258.)

The engineer train includes all vehicles, animals, and personnel for transporting heavy intrenching tools, explosives, and other engineer equipment and material which, under ordinary conditions, is required to accompany the division. (See Engineer Service, p. 264.)

Commander of Trains: A commander of trains is assigned for each division, together with the necessary assistants and troops.

By the proposed new organization tables the troops consist of two companies known as the Train and Military Police Force under the command of a field officer.

The commander of trains controls the marching and camping of the combined ammunition, supply, sanitary, and engineer trains. He is also charged with all matters of general police in the rear of the division while on the march and throughout the command while it is in camp. (See Military Police, p. 270.)

When combat is imminent, the ammunition, sanitary, and engineer trains are ordered released from the control of the commander of trains, and thereafter during the period of the combat operate in the manner described hereafter. (See Ammunition Service, p. 251; Sanitary Service, p. 258; and Engineer Service, p. 264.)

Upon the completion of the period of combat and when no longer required to operate independently, these trains revert to the control of the commander of trains.

When troops are in camp, out of the presence of the enemy, ammunition, supply, sanitary, and engineer trains may be ordered released from the control of the commander of trains and operated directly under the orders of their respective chiefs of service.

Supply Service: The zone of activity of a division operating, for an extended period of time, in a country devoid of local resources, is limited by the extreme radius of supply of the available transportation from the line of communications.

As the amount of transportation with a division is necessarily limited, contact of such force with the line of communications can be maintained for only a short distance to the rear. This distance is dependent on the character and amount of transportation and the condition of the roads.

In territory not wholly devoid of local resources; the radius of supply can be increased to a greater or less extent, depending upon the use that can be made of these resources.

A refilling point is the place where the empty vehicles of the *supply* train are refilled by the line of communications. It may be a rail, automobile, tractor, wagon, or water head, and it may be at or in advance of the advance supply depot of the line of communications.

A distributing point is the place where the ration sections of the *field* trains are replenished either from the supply train or the line of communications; in the latter case either directly from its depots or by means of its supply columns. When troops are advancing distributing points will usually be pushed forward close behind the troops, if possible, even up to the camping area, so that the ration vehicles may be able to refill without marching too far. In a retreat it may be advisable to deposit supplies along the probable line of retreat.

A rendezvous point is a place to which line of communications supply columns (usually autotrucks or tractors with wagons) are dispatched and where they are met by an agent of the commander of the field forces and conducted to distributing points. When it is possible to do so, rendezvous points may be fixed with advantage at the actual distributing points.

For troops in campaign there are two sources of supply, namely:

1. The theater of operations;
2. The base.

ALLOWANCE OF FORAGE AND APPROXIMATE WEIGHTS AND MEASURES OF FORAGE AND SUBSISTENCE

Kind of ration	Gross weight of 1 ration	Number of rations to a 40,000-pound box car (36 by 8 by 8)	Part of box car required for 1 ration	Number of rations to an Army wagon (2,765 pounds)	Number of rations to an auto-truck (3,000 pounds)	Cubic feet to 1 ration	Number of rations to a cubic foot	Number of rations to a ship's ton (40 cubic feet)	Part of a ship's ton required for 1 ration
Forage:	Pounds								
Oats—									
Horse	12	3,333	0.0003	230	250	0.39	2.564	102.6	0.00974
Mule	9	4,444	.000225	300	333	.2925	.342	136.75	.0074
Hay—									
Horse	14	1,571	.000636	175	175	1.12	.893	69.69	.0143
Mule	14	1,571	.000636	175	175	1.12	.893	69.69	.0143
Barley—									
Horse	12	3,333	.0003	230	250	.312	3.205	128.2	0.078
Mule	9	4,444	.000225	300	333	.234	4.274	170.9	.00585
Corn—									
Horse	12	3,333	.0003	230	250	.27	3.703	148.15	.00675
Mule	9	4,444	.000225	300	333	.2025	4.94	197.53	.00511
Bran—									
Horse	12	2,500	.0004	230	250	.72	1.39	55.55	.018
Mule	9	3,333	.0003	300	333	.54	1.85	74.07	.0135
Subsistence:									
Garrison	4.9	8,226	.000122	565	600	.149	6.73	269	.0037
Travel	4.1	9,818	.000102	675	750	.129	7.76	311	.0032
Field	3.0	13,428	.000075	920	1,000	.111	9.04	362	.0028
Reserve	2.0	20,142	.00005	1,380	1,500	.074	13.56	543	.0019

Service of the Theater of Operations

It is generally necessary to utilize to the fullest extent the food, especially the forage and grazing, available in the theater of operations. This becomes practically imperative when the line of communications runs through a country devoid of railroads and waterways.

When the theater of operations is in the home country or that of an ally, supplies are obtained by purchase; when in hostile territory, by purchase or requisition. It is a fundamental principle that all supplies available in the theater of operations should be utilized to the utmost.

Upon arrival of troops at mobilization and concentration camps, the ration savings privilege is suspended and entirely replaced by issues of rations in kind. This same restriction holds during the period of hostilities.

The garrison ration is intended to be issued in kind whenever possible. The approximate net weight of the garrison ration is 4.5 pounds.

The reserve ration is the simplest efficient ration and constitutes the reserve carried for field service. The approximate net weight of the reserve ration is two pounds.

The field ration is the ration prescribed in orders by the commander of the field forces. It consists of the regular ration in whole or in part, supplemented by articles requisitioned or purchased locally or shipped from the rear, provided such supplement or substitutes correspond generally with the component articles or substitute equivalent of the garrison ration.

In the field the authorized allowances must often be reduced and supplemented by grazing and other kinds of food, such as green forage, beans, peas, rice, palay, wheat, and rye. The amount of each issued depends upon circumstances. Wheat and rye should be crushed and fed sparingly (about one-fourth of the allowance). For unshelled corn, add about one-quarter weight.

FORAGE RATION

(Grain is the only forage carried in field and supply trains)

	For each animal		Substitute for oats		
	Oats	Hay	Barley	Corn	Bran [1]
	Pounds	Pounds	Pounds	Pounds	Pounds
Horse	12	14	12	12	13
Mule	9	14	9	9	13

[1] In lieu of that quantity of grain.

The commander of the field forces in the theater of operations may authorize in written orders the issue of increased allowances of forage for the animals of his command worn down by hard campaigning. Ordinarily this will be possible only during periods when the animals are within the immediate vicinity of the line of communications.

On the march grain is the only forage carried, and recourse must be had to grazing, if it is not possible to procure long forage in the country traversed.

The allowance of transportation of the forage ration with a division is based on carrying a 12-pound ration of grain for each horse and a 9-pound ration of grain for each mule.

Disposition of Rations: Organizations of all arms of a division carry on the man or animal and in field trains the same number of days' rations.

The same rule applies to grain carried on animals and vehicles. They are all distributed between men and vehicles of the ration section of the field train in the same manner, and therefore must be replenished from the supply train or column at the same time.

In campaign a command carries as a part of its normal equipment the following rations and forage:

(a) On each man: At least two days' reserve ration. Civil employees, etc., accompanying the combatant forces are also required to carry with them the same reserve as enlisted men.

For each draft animal: On each vehicle, a reserve of one day's grain ration for its draft animals.

Reserve rations are consumed only in case of extreme necessity, when no other supplies are available. They are not to be consumed or renewed without an express order from the officer in command of the troops who is responsible for the provision of supplies, namely, the division commander or other independent detachment commander.

Every officer within the limits of his command is held responsible for the enforcement of this regulation.

Reserve rations consumed must be replaced at the first opportunity.[1]

In addition to the foregoing, commanders will require each man on the march to carry the unconsumed portion of the day's ration issued the night before, for the noonday meal. In the same manner, cavalry and field artillery carry on their horses a portion of their grain ration issued the night before, for a noonday feed.

(b) In the ration section of the field train: For each man two days' field, one day's reserve, and for each animal two days' grain rations. Organizations equipped with rolling kitchens carry one day's field ration in the rolling kitchen, a corresponding reduction being made in the number of other vehicles attached to the ration section.

The one day's reserve ration is intended to provide for replacing immediately any reserve ration carried by the man which may be consumed. The two remaining days' field rations are more varied in character.

(c) In the supply train—

Of an infantry division two days' field and grain rations;

---

[1] This includes frequent renewal of the bacon component, which is liable to deteriorate.

Of a cavalry division one day's field and grain rations.

The supply train of a typical division contains 7 wagon companies, or 189 wagons.

Summary for Usual Division: Rations for each man, on person, two days' reserve; in field train, one day's reserve, two days' field; in supply train, two days' field; total, seven rations for men. Grain for each animal, on animal or the vehicles it draws, two days' reserve grain; in field train, two days' grain; in supply train, two days' grain; total, six days' grain for animals.

Independent cavalry, when in front or on the flanks of an army, will have to depend to a great extent on the resources of the country. The rapid operations of cavalry often necessitate complete separation from slow-moving field and supply trains during extended periods. Autotrucks are employed, whenever possible, in the supply of independent cavalry.

Ordinarily rations and grain are issued to troops during the afternoon from the ration section of the field train sent forward for the purpose. These supplies provide the evening meal, the following day's breakfast, and the lunch to be carried on the man, and in addition, grain for the evening's feed, the following morning's feed, as well as the noonday feed to be carried in the nose bag.

The service of supply is directed and controlled in orders and instructions issued by the division commander. These orders fix the distributing point or points to which the empty vehicles of the ration sections of the field trains are to be sent for resupply. The commander of trains is advised by division headquarters of the location of the refilling point to which the empty vehicles of the supply train can be sent for replenishment. The commander of trains then directs the movement forward of the necessary number of loaded vehicles of the supply trains to the distributing points, and makes arrangements for their prompt return and for reloading all empty vehicles of the supply train at refilling points.

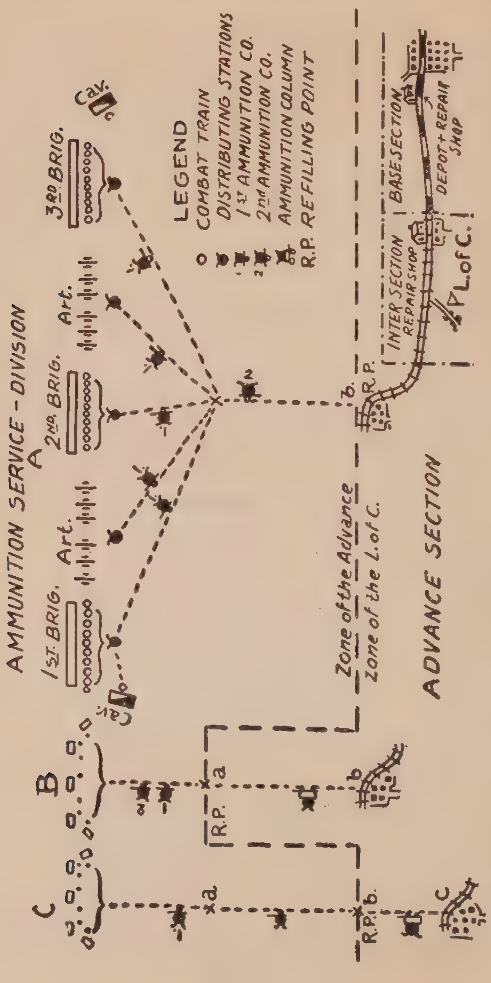
It is noted in the European War that supplies are carried forward by rail as far as possible; in some cases the rail service is extended by narrow-gauge field railways to within four or five miles of the line, and not infrequently spurs and loops of this field railway are brought into the labyrinth of trenches between the first and second lines of a defensive position. Wagons carry the ammunition and rations from the field depots to the lines in the usual case. Many autotrucks are used, but they have not yet taken the place of the wagon.

The field or traveling kitchen is in almost universal use in Europe, and it goes everywhere. It seems to be absolutely satisfactory, and one serves a company of 250 men. They are set up in the nearest village to the lines, that is, as close as practicable, and at night they drive in with hot meals to within easy reach of the actual trenches. The food may be carried from them by hand, but the effort is made to insure the men of the trenches at least one full hot meal daily. The officers are also often subsisted from the same kitchen as the men. The field kitchen is regarded by the troops as indispensable and of almost as much importance as their guns. In trains and smaller organizations than a company a two-wheel kitchen may be used.

Ammunition Service: The system of replacing ammunition differs somewhat from that by which rations and grain are replenished. No ammunition is obtainable locally and, therefore, all the mobile ammunition reserves with the division must be replaced by the line of communications. The requirements of rations and grain are continuous, whereas the requirements of ammunition are spasmodic and neither the exact quantity nor the time of replenishment can be foreseen.

The organization and operation of the ammunition service is the duty of the field artillery. The commander of the ammunition train is the immediate subordinate of the division artillery commander after the ammunition train has been released from the control of the commander of trains.

Ammunition carried on the man and on the caissons of the firing batteries is replaced by that carried in organization combat trains. These latter trains are ordinarily refilled from vehicles attached to the ammunition train, though in certain instances they may be refilled directly from


AMMUNITION SERVICE - DIVISION
A
1ST BRIG.
Art.
2ND BRIG.
Art.
3RD BRIG.
Cav.
Cav.
LEGEND
COMBAT TRAIN
DISTRIBUTING STATIONS
1ST AMMUNITION CO.
2ND AMMUNITION CO.
AMMUNITION COLUMN
R.P. REFILLING POINT
Zone of the Advance
Zone of the L. of C.
R.P.
b.
INTER SECTION
REPAIR SHOP
BASE SECTION
DEPOT + REPAIR SHOP
L. of C.
ADVANCE SECTION
B
R.P.
a
b
C
a
R.P.
b.
c

the line of communications or from ammunition columns.

Ammunition Distributing Station: An ammunition distributing station is the place where combat trains are sent to be resupplied.

Ammunition Refilling Point: An ammunition refilling point is the place where the ammunition train is refilled.

Ammunition Rendezvous Point: An ammunition rendezvous point is the place to which the ammunition columns of the line of communications are dispatched and where they are met by agents of the ammunition train and conducted to refilling points.

The divisional ammunition service is directed by the commander of the ammunition train, and includes the supply of both small-arms ammunition and field-artillery ammunition.

After an engagement every effort is made to replace, without delay, all ammunition reserves with the division. The ammunition carried on the man, with the firing batteries and on the combat trains is first replaced, then that carried on the ammunition train is replaced.

Ammunition Supply in Trench Warfare: In the European War the normal method of supply has been found satisfactory in operations in the open, but for trenchwork a modification had to be made. A brigade small-ammunition reserve was collected near brigade headquarters some 500 yards in rear of the center of the line of trenches held by the brigade. This reserve was

ARTILLERY AMMUNITION

Weights of Ammunition and Containers—Carrying Capacity, in Rounds, of Pack Mules and Vehicles

Articles	Wt. each unit		Number packed in box	Space occupied by packing box	Weight of box packed	Carrying capacity of—			
	Pounds	Ounces				Pack mule	Army wagon	Auto-truck	Caisson with limber
				cu. in.	lbs.	Rounds	Rounds	Rounds	Rounds
Ball cartridge, for U. S. magazine rifle, model of 1903 (in bandoleer) (wooden box)	.....	0.89	1,200	2,704	100	2,400	33,600	36,000	......
Same, in metallic packing chest	.....	.89	1,200	1,820	91.5	2,400	36,000	39,600	......
Ball cartridge, for U. S. magazine rifle, model of 1898 (in bandoleer)	.....	1 00	1,200	2,329	99.75	4,000	33,600	36,000	......
Ball cartridge, for U. S. magazine rifle, model of 1898	.....	1.00	1,000	1,914	79	3,000	35,000	38,000	......
Caliber .45 ball cartridges, for revolver and also for automatic pistol	.....	.80	2,000	2,099	120	4,000	46,000	50,000	......
Caliber .38 revolver ball cartridge	.....	.50	2,000	1,348	76	6,000	72,000	78,000	......
2.95-inch mountain gun, common steel shell, 18-pound, for pack outfit, assembled rounds	20	6.40	5	2,922	101.25	10	135	150	......
2.95-inch mountain gun, shell and shrapnel, 12.5-pound, for pack outfit, assembled rounds	15	.....	6	2,950	122	10	132	150	......
3-inch field gun, shrapnel, 15-pound, assembled rounds	19	6.00	4	3,736	106.5	.....	104	112	106
3-inch field gun, steel shell, 15-pound, assembled rounds	18	14.00	4	3,769	106.5	.....	104	112	106
3-inch field gun, cast-iron shell, 15-pound assembled rounds	19	14.00	4	3,324	107	.....	104	112	106

3.8-inch howitzer, high explosive steel shell, or shrapnel, 30-pound, assembled rounds........	34	8.00	2	1,265	89	.....	62	68	48
4.7-inch gun, high explosive steel shell, or shrapnel, 60-pound, assembled rounds.............	73	8.00	1	2,184	93.5	.....	30	32	56
4.7-inch howitzer, high explosive steel shell, or shrapnel, 60-pound, assembled rounds........	67	.....	1	1,963	87	.....	32	34	30
5-inch gun, cast iron shell, 45-pound, assembled rounds....................................	45	8.00	2	3,827	138.5	.....	40	44	......
6-inch howitzer, high explosive steel shell or shrapnel, 120-pound, assembled rounds.......	132	.....	1	4,586	162	.....	17	18	28
7-inch siege howitzer, shrapnel, 105-pound, filled and fused, assembled rounds.................	105	8.00	1	2,730	130.5	.....	21	23	......
7-inch siege howitzer, cast-iron shell, 105-pound, assembled rounds	105	.....	1	3,037	131	.....	21	23	......

NOTE.—In determining the loads of pack mule and army wagon, it was assumed that the ammunition would be carried in original packing boxes, except as to mountain artillery ammunition, which is held in special carriers on pack mule.

SMALL-ARMS AMMUNITION

ALLOWANCES TO BE CARRIED IN THE FIELD

	A For each man armed with rifle			B For each man armed with pistol[1]			C For each machine gun			Line of communication			
	With organization			With organization			With organization						
	In the belt	In combat train	In ammunition train	In the belt	In combat train	In ammunition train	On mules	In combat wagons	In ammunition train	In ammunition column	Advance section	Intermediate section	Base section
Infantry	100	120	220	21	21	21	[2]6,250 [3]4,800	12,000	18,000	As ordered. (To replace ammunition used in combat an amount not less than that carried by the mobile forces is kept in ammunition column, or at or near the advance depot; and an additional amount approximately equal to all ammunition with the mobile forces and near the advance section is maintained at the base or intermediate section.)			
Cavalry	90	130		21	21		[2]6,250 [3]4,800	12,000					
Artillery, (light, heavy, horse and mountain	...	...		21	21		......	......	......				
Engineers	80	140		21	21		......	......	......				
Signal troops[4]	...	...		21	...		......	......	......				

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[1] If revolver is carried, the number of rounds is 20.

[2] Maxim machine gun.

[3] Automatic machine rifle.

[4] Signal troops requiring ammunition, draw from the nearest ammunition wagons.

replenished from the nearest ammunition train or column. The brigade reserve kept the small ammunition carts of the battalions fully supplied usually refilling each night.

A supply of small-arms ammunition is also kept in the trenches of each battalion in boxes distributed among the several companies. The expenditure is often very large and headquarters is frequently asked to send up further supplies to battalions during an attack. On receipt of such messages men from the reserve carry boxes forward to the firing lines, but sometimes small parties from the support trenches are sent back to get the ammunition which they bring in large numbers of filled bandoliers.

SUPPLIES OTHER THAN AMMUNITION CARRIED ON COMBAT TRAIN

	Machine-gun company or detachment	Infantry battalion	Cavalry squadron	Artillery	Engineer	Signal
Axes	4	16	16	Such supplies and equipment as are required for the technical service of these troops and which will be continually with organization.		
Picks	4	16	16			
Shovels	8	16	16			
Pack saddles	....	2	2			
Litters	1	7	7			
Total weight.....pounds	152	436	436			

When an attack begins, ammunition from the reserves is at once demanded, although ample supplies may be in the firing line.

Each night after dark the small-arms ammunition carts bring up fresh supplies from the rear. By day these carts remain some two miles back under cover.

Battalions make a practice of issuing fifty additional rounds per man when an engagement is probable, and always in the trenches.

Sanitary Service: In general, the functions of the sanitary service are as follows:

(a) The institution of all practicable sanitary measures, to the end that the fighting forces suffer no depletion in strength due to avoidable causes.

(b) The temporary care and professional treatment of the sick and wounded and their transportation to accessible points where they are transferred with as little delay as possible to the line of communications.

(c) The supply of the necessary sanitary equipment.

In addition, the sanitary service is charged with the preparation and preservation of individual records of sickness and injury in order that claims may be adjudicated with justice to the government and the individual.

The personnel of the sanitary service in the zone of the advance may be classified into two general groups, as follows: First, that attached to organizations smaller than a brigade, which functions under the immediate orders of the organization commander and accompanies its unit into combat; second, that attached to the sanitary train, which functions under the orders of the division surgeon in accordance with such general or specific instructions as he may receive from the division commander.

When necessary the sanitary personnel attached to organizations may be temporarily detached, in whole or part, and directed to operate with the sanitary train.

Officers and men of all arms must have a knowledge of sanitation and its importance, to the end that no depletion of the fighting force occurs through avoidable causes. The importance of adopting and carrying out proper sanitary measures cannot be overestimated.

Commanders of all grades are responsible for the sanitary condition of the quarters or localities occupied by their commands and for the enforcement of all sanitary regulations. In addition they are responsible that all sanitary defects reported to them are promptly corrected.

A medical officer of experience, designated sanitary inspector, is charged, under direction of the division surgeon, with investigating and reporting upon the sanitation of the division to which he is attached. Sanitary inspectors report the result of their inspections to local commanders as well as to the division surgeon.

Every man with the division carries a first-aid packet. The sanitary detachments with organizations carry pouches containing appliances for first aid and stimulants. The combat train carries litters and the necessary equipment for regimental aid station.

This station, established by each regiment or independent battalion during combat and when justified by the number of wounded, is the place to which all wounded of the organization are carried by its sanitary personnel, and where emergency treatment is administered. The position of the station is fixed by the organization commander and is as near the firing line as possible.

These stations, established during combat by ambulance companies of the sanitary train in the immediate rear of the line of regimental aid stations, are the places where all wounded unable to walk are collected from regimental aid stations by bearers of ambulance companies.

The equipment for dressing stations and the necessary personnel are supplied by the ambulance companies of the sanitary train.

Ambulance companies push up close to the rear of the fighting troops and as near the line of regimental aid stations as possible and establish dressing stations. In addition to their functions at the dressing stations, they are charged with the transportation of the wounded back to field hospitals and with providing the necessary equipment for infirmary service in camps.

Field hospital companies form part of the sanitary train. They are set up when conditions so warrant, ordinarily some 3 or 4 miles from the battle field, and are the places to which the wounded are transported by ambulance companies. Their position must be one accessible both from the front and rear and where good water is available.

The sanitary column of the line of communications includes ambulance companies and evacuation hospitals; there may also be available railway hospital trains and boats, any or all of which may be used as the means for the evacuation of the sick and wounded from the division. The places at which the sick and wounded are transferred from the division to the line of communications elements are termed evacuating points.

The positions of evacuating points are fixed in the same manner as is the refilling point of the supply service and communicated directly from division headquarters to the commander of the sanitary train.

The sanitary train of an infantry division is composed of 4 ambulance companies, 4 field hospitals, and 4 camp infirmaries.

The ambulance companies comprise 21 officers and 602 men; 16 wagons, 48 ambulances; 80 riding horses, 16 pack mules and 264 draft mules.

The field hospitals comprise 25 officers and 294 men; 28 wagons; 68 riding horses, and 116 draft mules. Each field hospital has a capacity of 216 beds.

The camp infirmaries comprise 4 hospital sergeants, 4 privates, 4 wagons, and 16 draft mules, and are intended to serve the four brigades of the division.

The sanitary train is commanded by the division surgeon, or in his absence, by the senior medical officer of the attached elements, who, upon its release from the control of the commander of trains, operates it in accordance with orders or instructions received from division headquarters.

In camps an ambulance service is furnished from the sanitary train. Infirmaries are set up at convenient points by order of the division surgeon and operated by the sanitary personnel attached to the organizations which the infirmary serves. Here cases not requiring hospital treatment are cared for, all other cases being promptly removed by the ambulance service. The senior medical officer of the units served by the infirmary assumes charge of the same and is authorized to call directly on the other organizations for their proportionate share of medical officers and sanitary personnel for the infirmary service. The sergeant of the Hospital Corps detailed with the infirmary remains with it in charge of the equipment. If necessary, field hospitals are set up for the reception of the seriously sick and wounded.

When out of the presence of the enemy ambulances are ordinarily ordered distributed by the division commander throughout the column, in the rear of regiments, battalions, etc. A camp infirmary is assigned to each brigade and marches in its rear, and a field hospital should be so located in the column of march as to permit of its being available for the reception of seriously sick and injured as soon as possible after the arrival of troops in camp.

In the absence of medical assistance, the wounded apply their first-aid packets, if practicable. With this exception the care of the wounded devolves upon the sanitary troops, and no combatant, unless duly authorized, is permitted to take or accompany the sick or injured to the rear.

The sanitary personnel of organizations must remain with it when advancing into action and during the whole course of an engagement. Accordingly the wounded will be treated where their wounds are received, and the sanitary personnel will pause, if the organization is moving, only so long as is necessary to give appropriate first aid. At a later stage of the combat, when the movement of the organization permits and when justified by the number of wounded, a regimental aid station is established and operated.

In a retreat such portion of the sanitary personnel of the division as is required will remain with the sick and wounded that cannot be moved under the protection of the Red Cross flag.

The services of the National Red Cross Association, its equipment and personnel are utilized under the immediate direction of medical officers to the greatest extent possible in the care of sick and wounded in the service of the interior and on the line of communications. Their services are not utilized in the zone of the advance.

The emblem of neutrality is a red cross on a white ground. All persons belonging to the sanitary service, including the Red Cross Association personnel and chaplains attached to the army, wear on the left arm a brassard bearing this emblem stamped[1] by competent authority. Those not uniformed carry a certificate of identity in addition to the brassard.

All sanitary formations and establishments display a Red Cross flag accompanied by the national flag. At night the position of sanitary formations are marked by green lanterns.

Engineer Service: To each division is attached an engineer train organized into a headquarters and supply section, a searchlight section, and a pontoon section.

The supply section has ten wagons carrying heavy intrenching tools—one wagon for each infantry and cavalry regiment of the division—and four wagons carrying engineer supplies, sandbags, explosives, etc.

The searchlight section has ordinarily six large searchlights, with the necessary power and supply units, and twelve trench lights.

The pontoon section carries materials for two divisions of the heavy equipage, wooden pontoons, each division being capable of making a bridge 225 feet long with normal intervals between boats. Such bridge will carry vehicles weighing up to 6,000 pounds. The same material in a division of heavy equipage will make a

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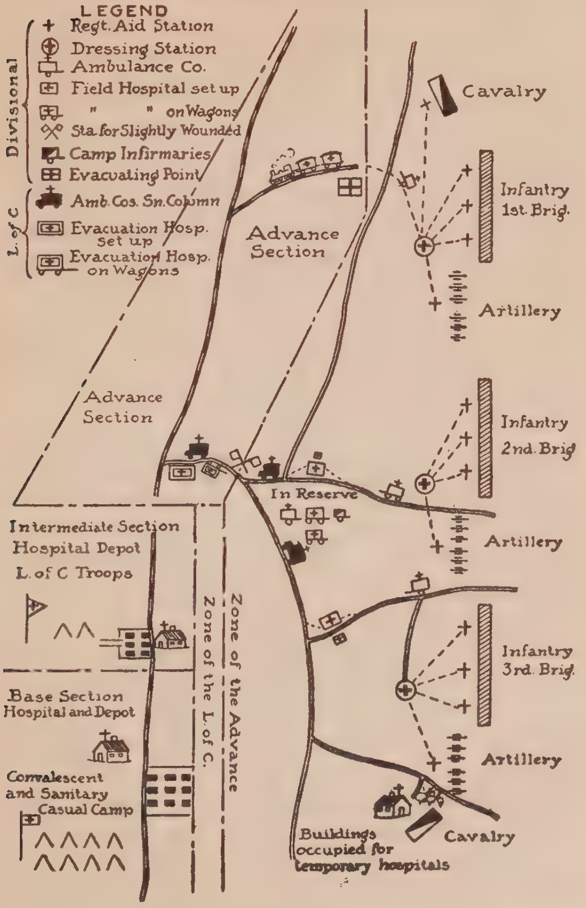
[1] For form of certificate see Rules of Land Warfare, United States Army.

SANITARY SERVICE OF A DIVISION



bridge with close intervals 150 feet long and capable of carrying vehicles weighing 12,000 pounds.

The engineer train of an infantry division is composed of 4 officers and 124 enlisted men, all of whom are engineers, either regular or from Officers' and Enlisted Reserve Corps, as may be directed by the Secretary of War. Among the personnel are to be found electricians, machinists, machinist's helpers for searchlights, etc., telephone operators, and linemen, as well as the usual trained engineer soldiers, mechanics, and wagoners.

In the train are 4 field and 60 combat wagons, 22 riding horses, and 296 draft mules. The arms carried are 53 rifles and 80 pistols.

The engineer train of a cavalry division is organized into a headquarters and supply section and a pontoon section. The supply section has nine wagons carrying tools, one wagon for each cavalry regiment. The remaining three wagons of the supply section carry engineer supplies, explosives, etc.

The pontoon section carries materials for three light (canvas) bridge divisions, each capable of making 185 feet of bridge for vehicles weighing up to about 5,000 pounds loaded.

If any motor trucks or tractors are included in the train each will have one chauffeur and one assistant chauffeur instead of a wagoner.

If there are sufficient motor vehicles to warrant it, the grade of stable sergeant may be filled by a machinist, and saddler and horseshoer by machinist's helpers as far as may be necessary.

The personnel of the train consists of 2 officers and 78 enlisted men, all of whom are engineers, either regular or from Officers' and Enlisted Reserve Corps as may be directed by the Secretary of War.

In the train are 4 field and 51 combat wagons, the latter including the tool wagons, pontoon wagons, etc.

There are 16 riding horses and 220 draft mules. The arms carried are 79 pistols.

SUMMARY OF MATERIALS CARRIED

Engineer train	Wagons of intrenching tools	Wagons of supplies, explosives, etc.	Searchlights		Materials for bridge, total length, feet
			Large	Trench	
Infantry division	10	4	6	12	450 heavy
Cavalry division	9	3	..	..	555 light

The organization and operation of the engineer train is the duty of the Engineer Corps. The engineer train is commanded by the senior engineer officer present with it, who, upon its release from the control of the commander of trains, operates it in accordance with the instructions of the senior engineer officer of the division.

The engineer column which is attached to the advance section of the line of communications includes in it such heavy engineer equipment as may be required, depending upon the character of operations reasonably probable, i. e., searchlights, pile drivers, map reproduction equipment, reserve of heavy intrenching tools, etc.

The engineer column may be temporarily assigned in whole or part to divisions or to operate directly under the orders of field army headquarters in the the zone of the advance. When so assigned, it is for the time being removed from the control of the commander of the line of communications. If assigned directly to field army headquarters it operates under the immediate orders of the chief engineer, if assigned to a division, it forms part of the engineer train.

When no longer required in the zone of the advance, it reverts to the control of the commander of the line of communications.

In mountainous regions the distribution of supplies, ammunition, and trench materials may sometimes present unusual difficulties, as in certain districts of the European War zone where the entire front may be occupied by troops, whereas the few excellent roads penetrating the lateral valleys of the region serve only limited sections of the front. These difficulties may be largely overcome by the use of cable roads or aerial cableways for the main arteries of communication and from these new roads or trails, and pack transportation over comparatively short distances for the immediate service of the trenches may be utilized. Aerial cableways may be readily operated in sections of about a mile to a mile and a half long, each section operated by a gasoline engine to drive the cable continuously. Transfer of the load must be made at the end of each section to the cable of the next section. Cables may be supported by cross arms fastened to special poles or to living trees at intervals of about 150 feet, with occasional long spans over gullies and ravines. A practical installation may have a capacity of about twelve tons per hour. It is practicable to transport every variety of supplies, construction materials, ammunition, and even the wounded may thus be

SUPPLIES ON ENGINEER TRAIN

LIST OF ARTICLES, NUMBER, AND WEIGHT TO BE CARRIED FOR EACH INFANTRY REGIMENT OF THE DIVISION

Article	Number	Weight
		Pounds
Axes	26	130
Crowbars	7	84
Nails ... pounds	95	95
Pick mattocks	149	671
Sandbags	450	256
Saws, hand	13	21
Saws, 2-man	13	52
Shovels	298	1,200
Wire ... pounds	25	25
1 carborundum wheel, 1 saw set for handsaws, 1 saw tool for 2-man saws, 6 saw files and container	...	37
Container for nails and edge tools	...	30
Explosives or other requisites	...	164
Total weight	...	2,765

taken safely to the rear if the exposed sections of the cable line can be operated at night.

Military Police: The duty of military police is to enforce all police regulations in the theater of operations and in mobilization and concentration camps. They protect the inhabitants of the country from pillage and violence and prevent excesses of all kinds; keep all roads clear; arrest all soldiers and civilian employees absent without proper authority from their organizations; arrest all marauders, and collect all stragglers and hand them over to their organizations. They keep a list and description of all camp retainers and followers and watch their conduct. They are charged with relieving organizations from the care of prisoners of war and with their safe conduct to places where they are ordered assembled.

They police all railroad stations, public houses, depots, and public buildings, protect telegraph and telephone lines and railways from damage; keep hostile inhabitants in order, carry out their disarmament, and prevent spying.

With the division, the commander of trains and the force under his orders exercise the functions of military police.

On the line of communications the commanders of defense districts exercise these functions, following up closely the advance of the division, taking over all prisoners of war, and performing the military police duties in rear of the zone policed by the commander of trains.

The defense commander of the area in and about the base of a line of communications is assigned as provost marshal. The functions of a provost marshal, in addition to those of general military police, are to receive and hold all classes of prisoners. He makes records of the prisoners of war, and collects and records the tags taken from the enemy's dead, as required by the laws and usages of war. The records of prisoners of war and of the enemy's dead are transmitted quarterly to the War Department.

In mobilization and concentration camps the powers of military police are ordinarily exercised by the commander of trains, though if conditions require, an officer may be assigned as commander of military police.

In cases of emergency the military police may call on any troop to assist them. All persons belonging to the military service are required to give every assistance to the military police in the execution of their duties.

Officers and enlisted men when actually performing the duty of military police will wear a blue brassard on the left arm halfway between the elbow and shoulder bearing the letters "M. P." in white.

As a rule, military police on duty will not be reprimanded or placed in arrest except by the superiors under whose command they happen to be. In exceptional cases field officers and officers of higher grades are authorized to order their arrest. Members of the military police when not on duty—that is, when not wearing the blue brassard—have no special privileges.

Censorship: Censorship within the theater of operations is controlled by the commander of the field forces. An officer is assigned as censor and is provided with such assistants as necessary. He performs his duties under the immediate orders of the Chief of Staff of the commander of the field forces.

Censorship includes (1) censorship over private communications and (2) censorship over press publications and communications.

All private communications (post cards, letters, parcels, telegrams, etc.) of officers, soldiers, foreign attachés, newspaper correspondents, and all other individuals, dispatched from the theater of operations are liable to censorship and to such delay in transmission as may be deemed necessary by the military authorities. A censor is authorized to suppress any statement which might be of value to the enemy or prejudicial to the welfare of the forces in the field.

All newspapers or journals in the theater of operations or in localities where martial law is in force are subject to censorship and, if necessary, their publications may be suppressed.

The press has public functions to perform with respect to the collection and dissemination of news concerning the operations of the army in time of war. The dissemination of falsehoods or distortion of facts, no less than the premature disclosure of movements or plans, is so fraught with dangerous consequences that the greatest care should be observed in its prevention. The press occupies a dual and delicate position, being under the necessity of truthfully disclosing to the people the facts concerning the operations of the army and, at the same time, of refraining from disclosing those things which, though true, would be disastrous if known to the enemy. It is perfectly apparent to everyone who considers the question that these important functions cannot be trusted to irresponsible people and can only be properly performed under reasonable rules and regulations with respect thereto.

XIV

Zone of the Line of Communications

A LINE of communications is established for each important force about to engage in field operations involving a movement from a base.

When two or more important forces are operating from a single base, they will be under the control of a single superior commander, and only one line of communications will be operated with a single base, and with such number of advance sections as may be required.

A line of communications is not organized when a force can safely occupy a territory without military operations of an extensive character. In this case administration and supply naturally and properly follow the same general principles as with troops in the home country.

The mission of the tactical units and administrative groups assigned to a line of communications is to relieve the combatant field force as far as possible from every consideration except that of defeating the enemy.

The point at which the base of a line of communications is to be established is fixed in War Department orders, upon recommendation of the commander of the field forces. The personnel for the line of communications comprises groups from every branch of the army and is sent ahead by the commander of the force to secure the base, and to make all arrangements for receiving, supplying, and forwarding the troops. If no additional personnel for this purpose has been assigned to the commander by higher authority, he details the necessary officers and men from the force under his command.

The zone of the line of communications embraces all territory from and including the base to the point or points where contact is made with the trains of the combatants field forces. The activities of the line of communications personnel are in general limited to this zone, except that lines of information are extended to contact with the headquarters of the field force, and that ammunition, supply, sanitary, and engineer columns will be pushed forward beyond this zone when necessary.

It is the duty of the commander of the line of communications to advance this line from time to time so as to maintain contact with the trains of the field forces.

Command: All troops, military establishments and personnel in the zone of the line of communications, are under control of its commander, except such as may be specially exempted by War Department orders.

He is responsible for the defense of the line of communications and for the government of that portion of the zone placed under military control.

Administration and Control: For administration and control the line of communications is organized as follows:

A service of defense;

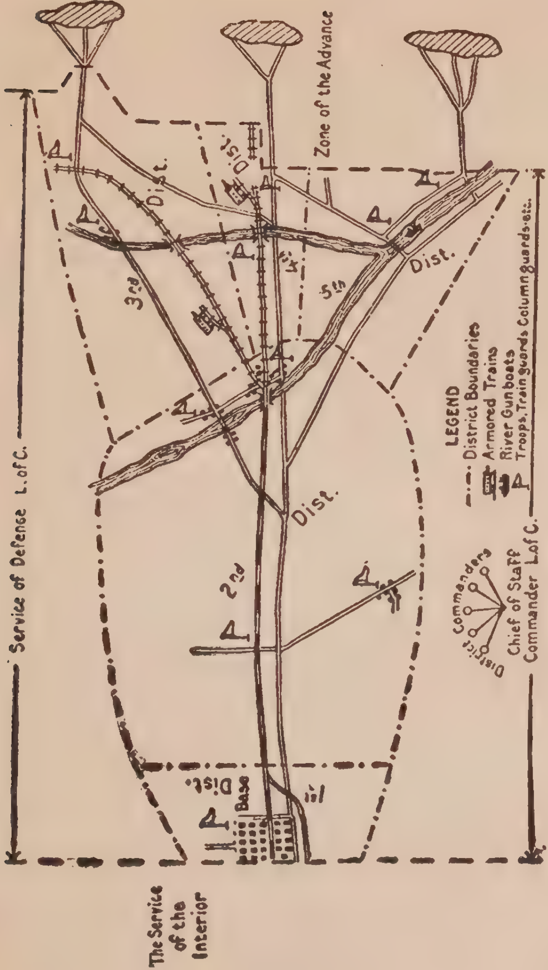
A supply, sanitary, and telegraph service;

A service of military railways.

The senior staff officer of each group of the base section of the supply, sanitary, and telegraph service of the line of communications acts as technical adviser of the commander of the line of communications on all matters relating to the operation of his corps within the zone of the line of communications.

Service of Defense: Suitable troops are assigned to duty under the commander of the line of communications and are charged under his orders with the defense of the line of communications and with the protection of all columns pushed out by the advance section of the supply, sanitary, and telegraph service. This territory is ordinarily divided into districts, each under a separate commander who is responsible for the defense and military police of his own district. These commanders have no control over properly authorized movements along the line of communications, of personnel, animals or matériel, except in case of imminent danger from the enemy. They are then responsible that traffic is stopped until, in their opinion, it may be safely resumed, or until orders from superior authority are received. The action taken will be at once reported by telegraph to the chief of staff of the

Zone of the Line of Communications



line of communications. Troops, ammunitions, or supplies going to the front are not to be diverted for the use of the line of communications troops, except by authority of the commander of the line of communications.

When armored trains are used their crews will form part of the line of communications troops and are under the direct orders of the commander of the district in which they are operating. Railway traffic is not to be interfered with by the use of armored trains except in the face of imminent danger from the enemy.

Supply, Sanitary, and Telegraph Service: The commander of the line of communications is in charge of all supply and sanitary matters and of the construction and maintenance of all lines of information within the limits of his command.

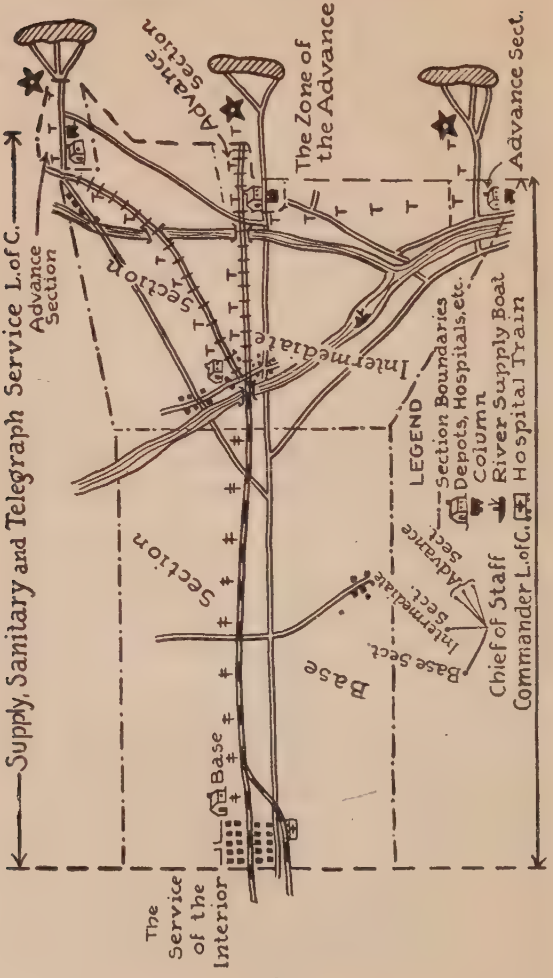
For the purpose of control and coordination of the supply, sanitary and telegraph service a line of communications is ordinarily divided into sections as follows: A base section and an advance section, each with an assistant chief of staff in charge competent to issue orders in the name of the commander of the line of communications. In certain unusual cases, due to an extensive prolongation of the line of communications, an intermediate section may be required. An advance section is required at the head of each important route of supply diverging from the base.

The operations of a base or intermediate section extend up to, but do not include, the depots, sanitary units, and telegraph stations of the next section in advance. Each section provides for the supply of the line of communications troops within its limits. So far as as possible formal accountability is terminated and replaced by a system of responsibility when supplies are turned over to troops or trains in the zone of the advance and to troops and trains of the section of defense in the zone of the line of communication. Commanders and staff officers of all grades are responsible for the proper use and disposition of supplies issued to their organizations and for supplies temporarily in their charge.

The assistant chief of staff with the base section is charged with coordinating the work of the quartermaster, medical, engineer, ordnance, and signal base groups.

He is informed of the probable requirements of the advance and intermediate sections, transmits this information to the officers in charge of the various groups and issued the orders for meeting these requirements.

The assistant chief of staff with the advance section is charged with coordinating the work of the quartermaster, medical, engineer, ordnance, and signal advance groups. The operations of these groups extend to and include the refilling points of the division supply trains, the evacuation points for sick and wounded, and, in certain instances, to the distributing points. The signal advance group establishes and maintains


Supply, Sanitary and Telegraph Service L. of C.
Advance Section
Advance Section
The Zone of the Advance
Advance Sect.
Section
Intermediate
Section
Base
Base
LEGEND
Section Boundaries
Depots, Hospitals, etc.
Column
River Supply Boat
Hospital Train
Advance Sect.
Intermediate Sect.
Base Sect.
Chief of Staff
Commander L. of C.
The Service of the Interior

lines of information with the headquarters of the field forces.

To the advance section are attached ammunition, supply, sanitary, and engineer columns. The strength and composition of these columns are dependent upon the character of operations reasonably probable.

Organization of the Line of Communications: Intermediate and advance sections are organized at the base and sent forward as required. Organization of an intermediate section generally follows that of the base section.

I. HEADQUARTERS

Commander line of communications;
Chief of Staff;
Assistant chiefs of staff;
Director of railways;
Adjutant;
Inspector;
Judge advocate.

The headquarters of a line of communications is ordinarily established and kept at the base.

II. SERVICE OF DEFENSE

The necessary number of troops for defense and military police of the district. The senior line officer of troops assigned to a district of the line of communications is the district commander. He appoints his staff from the commissioned personnel of his command.

Each district:

- District commander;
- Adjutant;
- Quartermaster;
- Sanitary inspector.

III. SUPPLY, SANITARY, AND TELEGRAPH SERVICE

1. Base section:

Assistant Chief of Staff in charge.

- (a) Quartermaster base group, quartermaster in charge.
  - Depot—
    - Finance and accounting division.
    - Supplies division.
    - Transportation and remount division.
    - Wagon or autotruck companies.
    - 1 field bakery company.
- (b) Medical base group—
  - Surgeon in charge.
  - Base hospital, capacity 500 beds each.
  - Supply depot.
  - Hospital train, capacity 200 beds each.
  - Convalescent camp.
  - Contagious disease hospital.
  - Red Cross.
- (c) Engineer base group—
  - Engineer depot.
- (d) Ordnance base group—
  - Ordnance depot.
- (e) Signal base group—
  - Signal officer in charge.
  - Telegraph companies.

2. Advance section:
   - Assistant chief of staff in charge.
     - (a) Quartermaster advance group—
       - Depot—
         - Quartermaster in charge.
         - Disbursing officers.
         - Depot personnel.
         - Supply column.
     - (b) Medical advance group—
       - Surgeon in charge.
       - Medical depot.
       - Sanitary column—
         - 1 ambulance company.
         - 2 evacuation hospitals, 324 beds each.
     - (c) Engineer advance group—
       - Engineer column.
     - (d) Ordnance advance group.
     - (e) Ammunition column.
     - (f) Signal advance group.

IV. SERVICE OF MILITARY RAILWAYS

Military controlling staff:
- Director of railways.
- Assistant director of railways.
- Assistant director of railways in charge of each important branch.
- Commander of engineer railway troops.
- Railway staff officer at each important station.
- Civilians.

Service of Military Railways: A service of military railways is organized when extensive military operations of a field force are dependent on a line or lines of railway for its supply in advance of the base. The construction, operation, and maintenance of these railways is a duty of the Corps of Engineers.

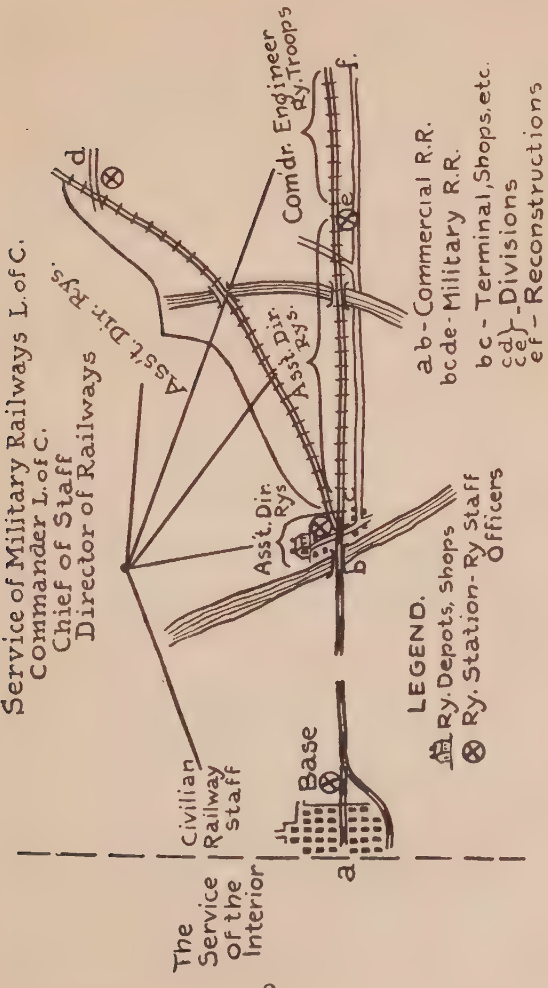
This service takes over from the field force all railways captured, assuming charge of their reconstruction, operation, and maintenance. It is also charged with the construction of new railway lines necessary for the supply of the field forces. It is controlled and directed by an officer detailed as director of railways, with a military controlling staff and an operating and constructing staff.

The director of railways is a member of the staff of the commander of the line of communications and is responsible to that commander for the successful operation, maintenance, and construction of the military railways. He receives his orders from that commander and takes the necessary steps to have them executed by his subordinates.

No military officer not attached to the service of military railways is allowed to give any orders to subordinates of the latter service or to interfere in any manner with the running of trains, except in the case of an impending attack. (See diagram appended.)

The staff of civilian assistants will consist of such railway officials, operatives, and other employees as may be available or necessary for the proper working of the military railways. As far as military conditions will permit, civilians

Zone of the Line of Communications



will be used for the operation, maintenance, and construction of the military railways, officers and soldiers being used only when military conditions render it necessary. These civilians are subject to military supervision, and will be responsible in their various departments and subdivisions for executing the duties assigned to them in accordance with the plans of the director of railways.

Channels of Correspondence: The commander of the line of communications must have the greatest possible freedom of action with reference to communicating with the War Department on matters of routine.

All such communications will be signed "By authority of the commander of the field forces" and will in general be confined to the following subjects, viz.:

(a) Arrangement for maintaining the supply of stores and animals.

(b) Matters relating to fiscal affairs or requirements.

(c) Irregularities, defects and deficiencies which come to his attention in the territorial or administrative zone to the rear of the base.

(d) Arrangements for augmenting or replacing the staff and civilian personnel of the line of communications.

(e) Arrangements for the evacuation of prisoners and of sick and wounded from the base.

After the system of supply and evacuation of sick and wounded has been fixed by the commander of the field forces, the commander of the line of communications and the assistant chief of staff of each advance section are authorized to communicate directly with the commanders whom they are ordered to supply on all detail matters relating to supply, evacuation of wounded, and maintenance of lines of information. Inversely, such commanders are authorized to communicate with the assistant chief of staff of the advance section in their immediate rear or with the commander of the line of communications on the same subjects.

TRANSPORTATION BY RAIL

Troops may be moved by rail over commercial railways or over military railways. The former condition will obtain in all movements in time of peace, and for most concentration movements in time of war. The latter condition will always obtain in the theater of military operations, and may obtain in concentration movements in our own territory.

In time of war or threatened war preference and precedence shall, upon the demand of the President of the United States, be given, over all other traffic, to the transportation of troops and matériel of war, and carriers shall adopt every means within their control to facilitate and expedite the military traffic.[1]

The movement of troops and their equipment over commercial railways is the function of the Quartermaster Corps, who plan and prepare for the move in conformity with regulations and orders from competent authority.

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[1] Extract from Chap. 3591, Part 1, Vol. XXXIV, Statutes at Large of the United States of America.

Orders covering such movements should give an exact return of the command, and transportation will be furnished at the rate of three men to each section in tourist sleepers, or three men to each two seats in day coaches. When day coaches are used for journeys of over twenty-four hours' duration, if practicable, a seat will be provided for each man.

Whenever organizations are moved by rail, with their animals, equipment, and matériel, it is desirable that complete units be kept together in trains divided into convenient train sections. It is preferable to have trains of moderate size with good speed rather than long trains with low speed.

If it is necessary to divide a train, some officers and men will accompany each section. The troops should not be separated from the animals if it can be avoided; but if the animals are shipped in separate sections selected detachments under officers accompany them, and such sections will precede the troops.

When supplies are shipped to mobilization or concentration camps, the contents of each car will be marked or placarded on the outside of the car, and the latter, when practicable, is also marked with the name of the organization to which the supplies are sent.

Preparation of Cars: Upon receipt of orders for the movement of troops by rail, the officer charged with supplying the transportation arranges with the railroad authorities for the necessary cars. He procures lists, with weights, of all property to be shipped and makes out the bills of lading, provides loading facilities and material for blocking and lashing, and constructs the necessary ramps.

Upon arrival of the cars, he inspects to see if they conform to the terms of the contract, and reports the result of his inspection to the commander.

Stock cars are inspected with especial care to see that they are in good order throughout. Projecting nails, bolts, and splinters, loose boards and rotten flooring, broken fixtures on hayracks, doors, or troughs, are sources of danger or discomfort to the animals, and of loss to the government. The cars should be clean before loading, and suitable noninflammable footing be provided.

Passenger cars must be clean, fully supplied with water and ice, and sufficiently lighted and heated. The urinals and closets must be in good condition, well supplied with water and toilet paper, and the sleeping accommodations must be according to contract.

After the cars have been accepted, the number of men allotted to each is marked on the side or steps. The cars are then assigned to organizations and plainly marked.

Loading and Entraining: At the proper time loading is begun and is carried on, usually by the troops, pursuant to the orders of the commander.

Heavy property may be loaded by details before the arrival of the troops.

Artillery and other carriages are made secure by lashings and by nailing blocks of wood to the flooring under the wheels.

The arrival of troops at the station should be timed so that there will be no delay in waiting for cars. When the barrack, camp, or bivouac is not more than a mile from the station, troops are not required to fall in until notice has been received that the cars are at the station and have been inspected and assigned. The command is then marched to the train and the property and animals loaded. The organizations are then marched opposite their cars.

The time required for loading each train depends upon the railroad facilities and upon the experience of the troops. For troops leaving station to go into the field, or changing station in the field, the time required should not exceed—

One and one-half hours for infantry.

Two and one-half hours for cavalry and light artillery.

Three hours for heavy artillery and for engineers with bridge train.

All movements of the troops in loading, entraining, and detraining, feeding and watering, and exercising men and horses are made, as a rule, in military formation and pursuant to command, thus avoiding confusion and saving time.

In movements by rail kitchen cars are provided, if practicable; otherwise, baggage cars are fitted up by the troops or arrangements are made for procuring meals, or at least liquid coffee, at stations en route.

Careful attention is paid to the messing of the men, whether in kitchen cars or in the coaches where the men ride. A mess officer supervises the preparation and serving of the meals and requires the men to keep their mess kits scrupulously clean.

When the stock cars provided are such that the animals can be fed and watered on the trains, it is unnecessary to unload them for exercise or recuperation unless the weather is very hot and the journey long.

Detraining and Unloading: The train schedule is arranged, when practicable, for arrival at destination in the morning. The troops are notified in time to prepare for detraining.

The officers and guard are the first to leave the cars. The commander meets the staff officer sent to the train, receives instructions, if any, gets his bearing, and orders the troops to detrain. As soon as the passenger coaches or sleeping cars are empty, the quartermaster, or a specially designated officer, accompanied by the conductor, if practicable, makes an inspection of the cars and notes their condition; the result is reported to the commander.

The troops procure their field kits and march to camp without delay, leaving suitable details to unload and bring up the property. If the camp is distant, arms are stacked and a part or all of the command unloads the train.

In the cavalry the men are marched to the vicinity of the stock cars, where the saddlebags and canteens are placed in line on the ground, under guard. The remaining articles of the field kit and horse equipments are then unloaded and placed with the preceding articles. The horses are then unloaded, saddled, and the troops formed.

Animals are unloaded quietly, each one being led to the opening so that his body will be athwart the car before leaving it.

The command may be marched to camp at once, if near the station; otherwise, picket lines are stretched, or the horses are held while the property is unloaded.

Artillery unloads in a manner similar to that of cavalry.

Hospital Trains: Hospital trains will be fitted up on each line of military railway. The necessary sanitary personnel and special equipment will be supplied from the base section of the supply, sanitary and telegraph services of the line of communications.

As far as practicable such trains, or other trains carrying sick and wounded who can travel sitting up, will leave the railhead at certain fixed hours daily.

In drawing up orders for the movement of troops by rail, the following points should be clearly stated:

(a) Date, place of entraining, destination, route to be followed.

(b) Hours of departure of trains; time at which troops should reach the entraining place, route that they should follow.

(c) Details in regard to feeding of troops, and watering and feeding animals en route.

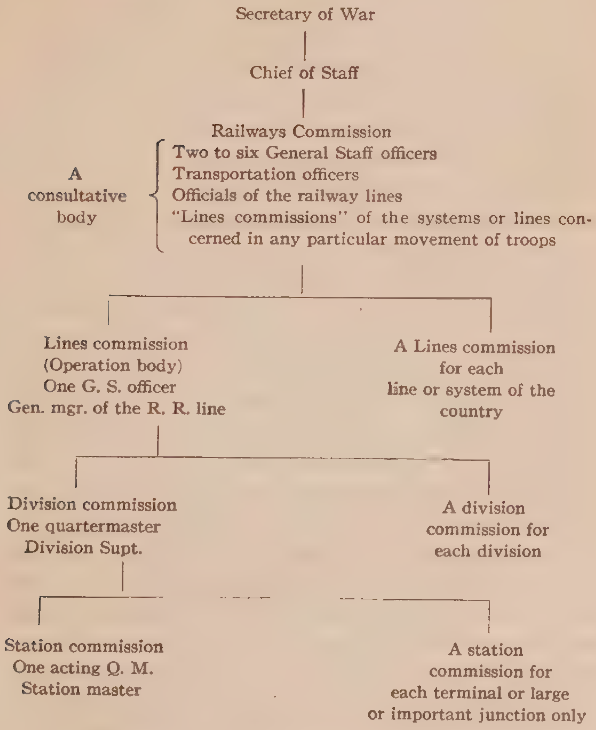
(d) Places of assembly near entraining and detraining stations.

(e) Schedule showing assignment of troops, animals, and vehicles to different trains.

Troops will not occupy railway buildings or use the railway facilities or property without authority from the railway staff officers.

Cooperation of Military and Railway Service: In a great movement of troops like a national mobilization or the concentration of a large force toward or in any limited section of the country we would require the most complete cooperation and mutual understanding between the heads of the military departments of the government and the railways officials and associations in order to avoid confusion and to insure prompt and orderly transportation of men and supplies. The actual work of furnishing the transportation of entraining and detraining men and animals and of supplying them en route is comparatively simple and can be successfully accomplished by the efforts of individuals without any particular system of control and cooperation. On a large scale, however, the circumstances are quite different, and the countries of Europe have found it necessary to organize in time of peace a joint control of the railways by the General Staff and the superior railway officials, and to bring this smoothly working machine to the necessities of war-time troop movements. This is the case in Germany, and in France where both French and English make use of the French railways under this combined management. An outline of the general features of this system is shown in the diagram on opposite page.

General Information: Officers of all arms should have some general knowledge of the details of railroad transportation such as the number of men and animals and different classes of vehicles that can be loaded in the several types of cars in ordinary use, the number of cars required to ship the several military units such as a company or battalion of infantry, a troop of cavalry and a battery of artillery, and the number of cars that can be economically drawn by a single locomotive over different grades. It is desirable in war time to ship units complete as far as possible with the men, animals, vehicles, and supplies pertaining to that group of men, so that if they become separated from the others of their command they are to a certain degree self-contained and self-supporting. It is found that a train of twenty cars will conveniently carry a battalion of infantry and its entire equipment, so this would be a good type to adopt for infantry, provided the grades of the railroad are such that a train of twenty cars can be hauled by a single locomotive. When crossing the mountains or using roads with many moderately steep grades such a train might have to be made smaller or broken


Secretary of War
Chief of Staff
Railways Commission
Two to six General Staff officers
Transportation officers
Officials of the railway lines
"Lines commissions" of the systems or lines concerned in any particular movement of troops
A consultative body
Lines commission
(Operation body)
One G. S. officer
Gen. mgr. of the R. R. line
A Lines commission for each line or system of the country
Division commission
One quartermaster
Division Supt.
A division commission for each division
Station commission
One acting Q. M.
Station master
A station commission for each terminal or large or important junction only

into two nearly equal sections. Studies of this sort for the various railroads of the country are valuable and should be made frequently and kept up to date and accessible ready for use in case of need. On the other hand, it will probably be found necessary to divide a battery of field artillery in order to make a suitable trainload for even the ordinary grades of our main rail lines. When this is done, each part should be an effective unit that could operate by itself for a time if need be. Two complete troops of cavalry can probably be put into a train of moderate weight and number of cars.

When moving a large body like a division, careful schedules must be made out beforehand and a systematic order of departure and arrival of trains insisted upon in order to make full use of the capacity of the railroad and to insure a constant and steady flow of trains over the line. It is better to provide for an extreme speed not to exceed twenty-five miles per hour and to try to get an average speed of ten miles per hour constantly throughout the day than to try to run the trains through at a high rate of speed. High speed increases the danger of a breakdown and consequent blocking of the line with far more loss of time than that due to a low rate of speed.

The provision of sufficient terminals for the prompt detraining of troops and unloading supplies and the clearing away of the empties so as not to block the following trains requires the most careful attention. Trains in a systematic movement of large forces are usually run in fleets of four to six sections, the headway between sections being ten to twenty minutes and that between successive fleets being one to two hours depending upon the urgency of the movement and the condition of the railroad and its rolling stock.

A valuable item of cooperation between railroads and the military relates to the building of cars to fit the requirements of the military or the arranging of the military units and the dimensions of vehicles, gun carriages, etc., to fit the standard size of cars. For example, flat cars or gondola cars are built regularly in several different lengths, and if it could be made known to the railroads which of these is most suitable for military uses that type might be adopted in future designs. Another step toward coordination and system would be the determination of the number of men, animals, and vehicles or guns that each of the existing types of cars, box, flat, gondola, stock, coaches, etc., could carry and to mark the capacity on the body or trucks of the car just as they now mark its capacity in tons and its dimensions. At a glance then an officer could tell just what a given car would hold.

XV

Orders

The art of giving proper instructions and orders to troops is one of the most important features in the exercise of command.

The expression of the will of leaders is conveyed in letters of instruction or by written or verbal orders.

Letters of Instruction: At the beginning of operations and from time to time thereafter the plans of the superior leaders are communicated in the form of letters of instruction. These regulate movements over large areas and for considerable periods of time.

Field Orders: Field orders regulate the tactical and such strategical actions of troops as are not carried in letters of instruction.

The field orders of army corps and division commanders are almost invariably written. When conditions demand the issuance of verbal orders, written orders follow.

The field orders of brigade commanders are usually written.

The field orders of regimental and smaller unit commanders are usually verbal.

The object of field orders is to bring about a course of action, in accordance with the intention of the leader, suited to the situation and with full cooperation between all arms and services. They are issued for marches, halts, formation of camps or bivouacs, advance, flank and rear guards, outposts, combat, etc.

In active operations, especially during engagements, numerous field orders are issued in fragmentary form—either verbally or in the form of notes, brief dispatches, messages, orders for assembly, etc.—which do not contain all the requirements of a formal written field order; but whenever detailed instructions for operations are given, whether verbally or in writing, the sequence prescribed for the body of a formal field order is preserved.

Administrative details are usually covered in "orders," but when circumstances make it more convenient they may be included in field orders.

To give subordinate leaders an opportunity to study the situation, field orders should reach them in ample time. As a rule, however, it is desirable to keep contemplated movements secret as long as possible, and to confine knowledge thereof to chiefs of staff departments and leaders of the larger units.

In large commands it requires some time for formal orders to reach all the lower units; this may be roughly estimated at one hour for a brigade and at one hour and a half for a division.

The hour stated in the heading of an order is the hour of signature.

Orders not connected with the tactical or strategical action of troops, but necessary in the ordinary administration of military affairs, are called general orders, orders, and special orders, according to circumstances.

General Orders: General orders include, generally, (1) all detailed instructions necessary in carrying out certain general regulations or orders issued from a superior headquarters; (2) all standing instructions, to the end that frequent repetition may be avoided; and (3) proceedings of general and special courts-martial.

General orders are issued by commanders of armies, army corps, divisions, brigades, regiments, and separate battalions.

Orders: Orders, in contradistinction to field, general, and special orders, are used by commanders of divisions and separate brigades for regulating the movements and resupply of the field trains, fixing the position of distributing points (rations and forage), authorizing the use of reserve rations, providing for the refilling of combat trains after combat or a march, providing for ambulance and hospital service in camps, and for furnishing such other similar information or instructions as it is desired to communicate to troops.

They also include such instructions as may be sent to the commander of trains, relative to the movements and disposition of the trains and information with regard to the arrangements made with the line of communication relative to the positions of refilling, rendezvous, and evacuation points.

When necessary, orders are used by commanders of battalions forming parts of regiments, and smaller units and detachments, for the same class of instructions as are promulgated by higher commanders in general orders.

Special Orders: These cover only such matters relating to the movements or assignment of individuals as are not necessary to be communicated generally to the command.

Verbal Orders: When not communicated by the leader in person, verbal orders are carried by staff officers or messengers. Important verbal orders are recorded as soon as practicable after issue.

As there is always a possibility of controversy as to their wording, verbal orders are sent by messengers in cases of necessity only, and when so sent rarely contain more than one definite mandate.

For example: "The brigade will halt three hours at ———." More latitude is allowed in sending verbal orders by officers.

The bearer of a verbal order or message is required to repeat it before starting.

Composition of Formal Field Orders: To frame a suitable field order, the leader must make an estimate of the situation, culminating in a decision upon a definite plan of action. He must then actually draft or word the orders which will carry his decision into effect.

Clear and decisive orders are the logical result of definite and sure decisions and are the means of transforming the decision into action.

In framing field orders the integrity of tactical units is preserved whenever practicable.

Field orders must be clear and definite. Expressions depending upon the viewpoint of the observer, such as right, left, in front of, behind, on this side, beyond, etc., are avoided, reference being made to points of the compass instead. The terms right and left, however, may be applied to individuals or bodies of men, or to the banks of a stream; in the latter case the observer is supposed to be facing downstream. The terms right flank and left flank are fixed designations. They apply primarily to the right and left of a command when facing the enemy and do not change when the command is retreating. The head of a column is its leading element, no matter in what direction the column is facing; the other extremity is the tail.

To minimize the possibility of error, geographical names are written or printed in ROMAN CAPITALS; when the spelling does not conform to the pronunciation, the latter is shown phonetically in parentheses, thus: BICESTER (Bister), GILA (Hee'-la).

When two or more places or features on the map have the same name they are distinguished by reference to other points.

A road is designated by connecting two or more names of places on the road with dashes, thus: LEAVENWORTH—LOWERMONT—ATCHISON road.

As a rule, an affirmative form of expression is used. Such an order as: "The supply train will not accompany the division," is defective, because the gist of the order depends upon the single word "not."

Written orders should be so distinct as to be legible even in bad light.

Field orders are brief; short sentences are easily understood; conjectures, expectations, reasons for measures adopted, and detailed instructions for a variety of possible events, do not inspire confidence, and should be avoided.

The commander should accept the entire responsibility. In framing field orders such expressions as "attempt to capture," "try to hold," "as far as possible," "as well as you can," etc., are forbidden. They tend to divide responsibility between the commander and his subordinates.

An order should not trespass upon the province of a subordinate. It should contain everything beyond the independent authority of the subordinate, but nothing more.

When the transmission of orders involves a considerable period of time, during which the situation may change, detailed instructions are avoided.

The same rule holds when orders may have to be carried out under unforeseen circumstances. In such cases letters of guidance are preferable; they lay stress upon the object to be attained, and leave open the means to be employed. Orders attempting to arrange matters too far in advance may have to be recalled and others substituted; such changes impose needless hardships upon a command and injure its morale.

Details of time and place are carefully stated. Subordinate commanders and staff officers are to regulate their watches by the time kept at headquarters.

Orders issued by subordinates should not be mere repetitions of those from higher authority with additions of their own. New orders are generally clearer and more satisfactory.

Form of Field Orders: To enable the will of the commander to be quickly understood to secure prompt cooperation among his subordinates and for ready reference, field orders are required to follow a general form. This form divides an order into sections or parts and assigns to each a particular class of information.

The parts of a field order are:

The heading;
The distribution of troops (in certain orders);
The body;
The ending.

The Heading: The heading contains the title or name of the issuing officer's command, the place, date, and hour of issue, the kind and the number of the order and reference to map used.

Titles are expressed as follows:

Det. I Div.;
Outposts, 6th Inf.;
Advance Guard, III Div.;
1st Brig. I Div.;
III Div.

In the above titles "Det. I Div." means that the command is composed of troops from the first division; "Advance Guard, III Div." means that the command is the advance guard of the third division.

The title may appear in the order creating a command, thus: "The Second Brigade will constitute the advance guard."

The title with place, date, and number thus fully identifies an order.

When named in the order, except in the title, the abbreviated form for the designation of tactical organizations is preferable. (See List of Abbreviations, Appendix III, p. 341.)

When a fraction of an organization cannot be designated by naming one or more of the subdivisions, it receives the generic title of "detachment."

Dates in the heading are abbreviated thus: 4 Feb. 08, 2:45 p. m.; 20 Jan. 17, 1:00 a. m.

The Distribution of Troops: The distribution of troops shows the tactical components into which a command is divided (advance guard, main body, etc.) and the troops assigned to each. It is generally used in march orders and in the first field order applying to a command newly created or organized. In other cases it is usually more convenient to name the troops in the body of the order, where their duties are prescribed.

When a "distribution" is used it is headed "Troops," and in written or printed orders is placed on the left of the body, occupying about one-third of the page. The tactical components are marked with lettered subheads (a), (b), etc., the troops listed under each performing the task prescribed in the similarly marked paragraph of the body of the order.

When orders are dictated or sent by wire or signals, the distribution of troops (if used) is given immediately after paragraph 2, without number.

The Body: The body contains information and instructions for the command, and is arranged in numbered paragraphs as follows:

Paragraph 1 contains such information of the enemy and of our supporting troops as it is desirable that subordinates should know.

Paragraph 2 contains the general plan of the commander, or so much thereof as will insure cooperation of all parts of the command.

Paragraph 3 contains the detailed tactical dispositions adopted by the commander to carry out the plan outlined in paragraph 2, including the tasks assigned to each of the several combatant fractions of the command. These tasks are given under lettered subheads (a), (b), etc., the leading fraction, or the one having the most important duty to perform, being generally considered first. For instance: In an attack order it is customary to consider the artillery first; in a march order, troops are considered according to their position in the column.

Instructions applicable to all of these fractions may be embodied in a subparagraph, lettered (x), at the end of paragraph 3.

Paragraph 4 contains instructions for the trains, and may designate the position of ammunition distributing stations, dressing stations, and stations for slightly wounded.

The last paragraph, usually paragraph 5, shows where the commander can be found or messages may be sent. In orders of subordinate commanders, this paragraph also gives the location of "lines of information," if any have been established.

If additional paragraphs are necessary, they are incorporated, properly numbered, after paragraph 4. Sometimes it is unnecessary to include instructions for the trains; but whatever the number of paragraphs the last always shows where the commander can be found, etc.

No abbreviations are used in the body of the order except a. m. and p. m. for morning and afternoon, the authorized abbreviations for tactical organizations, and those customary in designating rank. In naming a night both days should be mentioned thus: Night 4/5 Feb. 08. To designate "noon" and "midnight" these words are written.

The Ending: The ending contains the authentication of the order and a statement of how it is communicated to the command. This statement is an important feature of a field order and is communicated to the command. This state-responsible that it is properly distributed. Before orders are issued they are carefully tested to see that the entire command is accounted for.

Forms of Complete Field Orders: While the following forms are given for the convenience of officers in the field, and with a view of securing uniformity in the service, it must be remembered that no two military situations are the same. The sequence in paragraph 3 is not obligatory, the commander arranging the details according to his best judgment.

FOR AN ADVANCE

Field Orders (Title)
No. — (Place)
(Reference to map used) (Date and hour)

Troops:	1. (Information of enemy and of our supporting troops)
	2. (Plan of commander)
(a) Independent Cavalry: (Commander) (Troops)	3. (a) (Instructions for independent cavalry—place and time of departure, roads or country to be covered, special mission)
(b) Advance Guard: (Commander) (Troops)	(b) (Instructions for advance guard—place and time of departure, or distance at which it is to precede the main body, route, special mission)
(c) Main Body—in order of march: (Commander)[1]	(c) (Instructions for main body—distance at which it is to follow the advance guard, or place and time of departure)

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[1] If a commander is designated for the main body, his name is inserted here.

(d) Right (left) Flank Guard: (Commander) (Troops)	(d) (Instructions for flank guard—place and time of departure, route, special mission)
(e) Signal Troops: (Commander) (Troops)	(e) (Instructions for signal troops—lines of information to be established, special mission) (x) (Instructions for outposts—when relieved, subsequent duties) 4. (Instructions for field train—escort, distance in rear of column, or destination when different from that of main body, if disposition not previously covered in "Orders")

(Instructions for sanitary, ammunition, supply and engineer trains when necessary.)

5. (Place of commander or where messages may be sent.)

(Authentication)

(How and to whom issued)

For Advance Guards

Field Orders
No. —
(Reference to map used)

(Title)
(Place)
(Date and hour)

Troops:	1. (Information of enemy and of our supporting troops) 2. (Plan of commander)
(a) Advance Cavalry: (Commander) (Troops)	3. (a) (Instructions for advance cavalry—place and time of departure, roads or country to be covered, special mission)
(b) Support: (Commander) (Troops)	(b) (Instructions for support—place and time of departure, route, special mission)
(c) Reserve — in order of march: (Troops)	(c) Instructions for reserve—distance at which it is to follow support)

(d) Right (left) Flank Guard: (Commander) (Troops)	(d) (Instructions for flank guard—place and time of departure, route, special mission)
	4. (Instructions for field train—generally to join train of column if not previously covered in orders)
	5. (Place of commander or where messages may be sent, location of lines of information)

(Authentication)

(How and to whom issued)

A HALT FOR THE NIGHT—CAMP WITH OUTPOST

Field Orders (Title)
No. — (Place)
(Reference to map used) (Date and hour)

1. (Information of enemy and of our supporting troops, including independent cavalry)

2. (Plan of commander—to encamp or bivouac)

3. (a) (Designation of commander and troops of outpost,[1] general line to be held, special reconnaissance, connection with other outposts, if any)

(b) (Instructions for troops, not detailed for outpost duty—location of camp, designation of camp commander,[2] observation of flanks and rear when necessary, lines of information, conduct in case of attack)

4. (Instructions for field train—generally to join troops, though if near enemy, field train of outpost troops may be held in rear)[3]

(Instructions for sanitary, ammunition, supply, and engineer trains, when necessary)

5. (Place of commander or where messages may be sent)

(Authentication)

(How and to whom issued)

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[1] Where the advance guard is large the order may direct the advance guard commander to establish the outpost.

[2] Omitted when the chief exercises immediate command of the camp.

[3] May be provided for in "order" issued subsequently.

FOR OUTPOSTS

Field Orders
No. —
(Reference to map used)

(Title)
(Place)
(Date and hour)

Troops:	1. (Information of enemy and of our supporting troops) 2. (Plan of commander — to establish outpost, approximate line of resistance)
(a) Advance Cavalry: (Commander) (Troops)	3. (a) (Instructions for advance cavalry — contact with enemy, roads or country to be specially watched, special mission)
(b) Supports:[1] No. 1— (Commander) (Troops) No. 2— (Commander) (Troops) No. 3— (Commander) (Troops)	(b) (Instructions for supports —positions they are to occupy, and sections of line of resistance which they are to hold, intrenching, etc.)
(c) Detached Post: (Commander) (Troops)	(c) (Instructions for detached post—position to be occupied, duties, amount of resistance)
(d) Reserve: (Commander) (Troops)	(d) (Instructions for reserve—location, observation of flanks, conduct in case of attack, duties of special troops) 4. (Instruction for field train if necessary) 5. (Place of commander or where messages may be sent, location of lines of information)

(Authentication)

(How and to whom issued)[2]

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[1] Numbered from the right.

[2] For small outposts it may be more convenient to write this order without a marginal distribution of troops.

It is sometimes necessary to issue two outpost orders; the first as above, containing general instructions; the second, issued after an inspection of the line, and containing more definite instructions or involving changes.

For Positions in Readiness

Field Orders (Title)
No. — (Place)
(Reference to map used) (Date and hour)

1. (Information of enemy and of our supporting troops)
2. (Plan of commander—to take up a position in readiness at or near—)
3. (a) (Instructions for cavalry—to reconnoiter in direction of enemy, special mission)
(b) (Instructions for artillery—position or place of assembly)
(c) (Instructions for infantry—position or place of assembly, points to be especially held, reconnaissance)
(d) (Instructions for engineers—position or place of assembly)
(e) (Instructions for signal troops—lines of information)
4. (Instructions for field trains, sanitary, ammunition, supply and engineer trains if not previously covered in orders—generally to halt at designated localities in rear, ready to move in any direction)
5. (Place of commander or where messages be sent)

(Authentication)

(How and to whom issued)

For Defensive Positions

Field Orders (Title)
No. — (Place)
(Reference to map used) (Date and hour)

1. (Information of enemy and of our supporting troops)
2. (Plan of commander—to take up a defensive position at or along——, for the purpose of——)
3. (a) (Instructions for artillery—position, target, intrenching, etc.)

(b) (Instructions for fighting line—division of front into sections and assignment of troops thereto, intrenching, etc.)

(c) (Instructions for reserve—troops and position)

(d) (Instructions for cavalry—usually to cover with its main force the more exposed flank, a detachment being sent to patrol the other; reconnaissance)

(e) (Instructions for engineers—defensive work, clearing field of fire, preparation of obstacles, opening roads, etc.)

(f) (Instructions for signal troops—to establish lines of information)

4. (Instructions for sanitary train—location of dressing stations and station for slightly wounded)

(Instructions for ammunition train—location of ammunition distributing stations)

(Instructions for field and supply trains, if not previously covered in orders)

5. (Place of commander or where messages be sent)

(Authentication)

(How and to whom issued)

For an Attack

Field Orders (Title)
No. — (Place)
(Reference to map used) (Date and hour)

1. (Information of enemy and of our supporting troops)

2. (Plan of commander—indicating the general plan of attack, usually to envelop a flank)

3. (a) (Instructions for artillery—position, first target, generally hostile artillery)

(b) (Instructions for holding attack[1]—commander, troops, direction and objective)

(c) (Instructions for main attack — commander, troops, direction and objective)

(d) (Instructions for reserve — commander, troops, position)

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[1] This term "holding attack" as used in this form is for convenience only; it is never used in actual orders, as the vigor of an attack might be lessened if the troops knew it was "holding" only.

(e) (Instructions for cavalry—generally to operate on one or both flanks, or to execute some special mission)

(f) (Instructions for engineers—any special mission)

(g) (Instructions for signal troops—to establish lines of information between the commander and the main and secondary attacks, artillery, reserves, etc.)

4. (Instructions for sanitary train—location of dressing stations and stations for slightly wounded when practicable)

(Instructions for ammunition train—location of ammunition distributing stations)

(Instructions for field and supply trains, if not previously covered in orders)

5. (Place of commander or where messages be sent)

(How and to whom issued) (Authentication)

Note: In war it is not always possible to issue a complete attack order like the above, disposing of an entire command. In unexpected encounters, for instance, orders must be given as the situation develops.

For a Retreat

Field Orders (Title)
No. — (Place)
(Reference to map used) (Date and hour)

Troops:	1. (Information of enemy and of our supporting troops) 2. (Plan of commander—to retire in direction of ——)
(a) Leading Troops: (Commander) (Troops)	3. (a) (Instructions for leading troops– place and time of departure, route, special mission)
(b) Main Body—in order of march: (Troops)	(b) (Instructions for main body—place and time of departure, route)

(c) Rear Guard: (Commander) (Troops)	(c) (Instructions for rear guard—distance from the main body or place and time of departure, special mission)
(d) Right (left) Flank Guard: (Commander) (Troops)	(d) (Instructions for flank guard—place and time of departure, special mission)
(e) Signal Troops: (Commander) (Troops)	(e) (Instructions for signal troops—lines of information)
	(x) (Instructions for outposts—when relieved, subsequent duties—usually forming the rear guard)
	4. (Instructions for field and divisional trains—place and time of departure, route, escort; these trains are generally some distance ahead of the column)
	5. (Place of commander or where messages may be sent)

(How and to whom issued) (Authentication)

For Rear Guards

Field Orders (Title)
No. — (Place)
(Reference to map used) (Date and hour)

Troops:	1. (Information of enemy and of our supporting troops)
	2. (Plan of commander — mission of rear guard)
(a) Reserve — in order of march: (Troops)	3. (a) (Instructions for reserve—place and time of departure, or approximate distance from main body, reconnaissance)
(b) Support: (Commander) (Troops)	(b) (Instructions for support—place and time of departure or distance from reserve, any special reconnaissance)
(c) Rear Cavalry: (Commander) (Troops)	(c) (Instructions for rear cavalry—place and time of departure, road or country to be covered, special mission)

(d) Right (left) Flank Guard:
(Commander)
(Troops)

(d) (Instructions for flank guard — place and time of departure, route, special mission)

4. (Instructions for field train when necessary—usually to join train of main body)

5. (Place of commander or where messages may be sent—location of lines of information)

(Authentication)

(How and to whom issued)

March Table: In movements of large forces on several roads, it is sometimes desirable to prescribe the daily marches of the various columns for two or more days. In such cases the order may often be simplified by appending or incorporating a march table usually in the following form, each column providing its own security:

—— Army, from——(date) to ——(date)
(Reference to map used)

Date	—— Division	—— Division	Army hq.
	Location of main body or of advance guard at end of each day's march, and line of march, if necessary.	Location of main body or of advance guard at end of each day's march, and line of march, if necessary.	Location at end of each day's march.

To illustrate this important subject five typical orders follow:

Orders

1. *Orders of Advance Guard Commander for a halt for the Night and Establishment of Outposts.*

Advance Guard, I Division.
EMMITSBURG, MD.,
1 July 13, 2:10 p. m.

Field Orders
No. —
Gettysburg—Antietam
3-inch map.

1. A hostile force of about one division is going into camp south of WOODSBORO.

Our cavalry is at LOYS and TANEYTOWN and our I Division camps near FAIRPLAY.

2. This advance guard will camp near EMMITSBURG.

3. (a) The 1st Inf. and one tr. 1st Cav., Col. A will form the outpost. The outpost line will extend from the EMMITSBURG—THURMONT road through MOTTERS to the MONOCACY. The bridges over the MONOCACY at BRIDGEPORT and one mile north will be held. The troop of cavalry assigned to the outpost will remain at LOYS until it receives orders from the outpost commander.

(b) The remainder of the advance guard will camp as follows:

2d Inf. east of EMMITSBURG, between the EMMITSBURG—GETTYSBURG road and the EMMITSBURG—TANEYTOWN road.

3d Inf. north of EMMITSBURG, between the EMMITSBURG—GETTYSBURG road and FLAT RUN.

1st Bn., 1st F. A. north of EMMITSBURG, between FLAT RUN and the EMMITSBURG—421 road.

Co. A 1st Engrs. and Amb. Co. No. 1 northwest of EMMITSBURG, west of the EMMITSBURG—421 road.

4. Field trains will join their commands. Issues will be made from Sp. Tn. at 9:00 p. m. Distributing point at CROSSROADS 619, 2½ miles northwest of FAIRPLAY. Field train wagons will not pass through FAIRPLAY in going to or returning from distributing point.

5. Messages to camp for the 2d Inf.

By command of Brig. Gen.
S——, *Brig. Adj.*

Dictated to staff and officers sent to receive orders for the 1st, 2d, and 3d Inf.; 1st Bn. 1st F. A.; Co. A, 1st Engrs. and Amb. Co. No. 1. Copy by Corp. C., motorcyclist, to Division Commander.

2. *For an Advance.*

Field Orders
No. —
U. S. Geol. Surv. Map.

Detachment I Division,
Camp at Easton, Kans.,
19 Sept. 05, 3:00 p. m.

	1. Hostile patrols have been seen east of the MISSOURI River and hostile infantry and artillery are reported one day's march east of LEAVENWORTH. The remainder of our I Division is at WINCHESTER. 2. This detachment will march to-morrow on FORT LEAVENWORTH.
(a) Independent Cavalry: Maj. A5C 1st. Sq. 5th. Cav.	3. (a) The independent cavalry will start at 5:30 a. m., covering the movement. It will seize and hold the bridge over the MISSOURI River.
(b) Advance Guard: Maj. A6I Det. Mtd. Engrs. 1st. Bn. 6th Inf.	(b) The advance guard will clear the eastern exit of EASTON at 5:50 a. m., and will march by the EASTON — FRENCHMAN — FORT LEAVENWORTH road.
(c) Main body (in order of march): 6th Inf. (less 2 bns.) 1st Bn. 3d F. A. 3d Bn. 6th Inf. Co. A. 1st Engrs. less det.) Det. Amb. Co. No. 1	(c) The main body will follow the advance guard at one half mile.
(d) Signal troops: Det. 1st Bn. Sig.	(d) The signal troops will maintain communication between detachment headquarters and the independent cavalry.
	4. The field trains will follow

the main body at one mile to FRENCHMAN, where they will halt until further orders.

5. Messages to main body until 7:00 a. m.; thereafter to advance guard.

By order of Col. F.
R——, *Adj. 6th Inf.*

Copy in person to staff, Bn. Comdrs., Comdrs. Engrs., Sig. and Sn. Det.

Copy to Division Commander by Lieut. E.

3. *Orders for an Attack.*

Det., I Div.
Knoll 547, 1 mi. n. e. HARNEY,
16 Dec. 10-30 a. m.

Field Orders
No. ——
(3″ map) Gettysburg.

1. Two enemy regiments are in position at HARNEY: left, near roadfork 484; right, 550 yards southeast of center of HARNEY. Two hostile batteries are standing in field 500 yards southwest of HARNEY center. A hostile troop withdrew before our squadron to the south of HARNEY.

A hostile column is nearing EMMITSBURG from the northwest, with a squadron a few miles ahead.

2. This detachment will attack towards HARNEY, enveloping the enemy's left. March conditions cease.

3. (a) 1st Bn., 1st F. A., will take position, in observation, between roadfork 485 and knoll 547, to support the attack.

(b) 2d Inf. will advance, with its center near the KOON—HARNEY road, upon a front of 1,000 yards, to attack the hostile position from the enemy right to the fence about 500 yards northwest of the KOON—HARNEY road.

(c) 1st Inf. will make the enveloping attack. From roadfork 485, it will advance between the large patch of timber, west of knoll 547, and the stream, 350 yards west of HEADGEGROVE S. H. Its left will take the direction western extremity this patch of timber—large white house, standing by itself north of HARNEY. (House 500 yards north of 500.)

(d) Both regiments will await further orders to advance from the line HEADGEGROVE S. H.—roadfork 522.

(e) 3d Inf. and Engrs. (less mtd. det.) will follow the 1st Inf., in reserve, to roadfork 482.

(f) 1st Sq., 1st Cav. (reenforced by Mtd. Engrs.), when the infantry reaches vicinity knoll 547, will move to the south and will cover our left, sending one platoon to cover the right. It will send, at once, to destroy all bridges from BRIDGEPORT to BARLOW, both inclusive. It will maintain touch with the hostile troops toward EMMITSBURG.

(g) Sig. Troops will connect Brig. Hq. with the 3 regs. and the art.

4. Amb. Co. No. 1 will halt 1 mile east of KOON.

5. Messages to road junction 250 yards, southwest of knoll 547.

A, *Brig. Gen.*

Copies to organization commanders as they report. General A verbally impresses upon the squadron commander the necessity for getting down the bridges toward Clear Ridge farm at the earliest possible moment.

When the deployment is completed, General A directs the major of artillery: "Open fire; Target, the hostile artillery." General A then telephones the 1st and 2d Regiments, "Advance and attack."

4. *Occupying a Defensive Position.*

Det. I Division,
Field Orders — SPANGLER HOUSE, HANOVER ROAD,
No. — 2 Sept. 15, 1:30 p. m.
(Gettysburg-Antietam 3-inch map.)

1. A hostile force of all arms, estimated at two weak brigades, is advancing east from GETTYSBURG on the HANOVER ROAD. Its leading element is now in contact with our rear guard at BENNERS HILL. Reenforcements for our detachment are now en route by rail from YORK.

2. This detachment will at once occupy a defensive position along the line Hill 571—Ridge 560, crossing

the HANOVER ROAD 500 yards east of J. SPANGLER, to oppose further advance of the enemy and insure safety of the trains. March conditions now cease.

3. (a) The 1st Bn., 1st F. A., will take a position in observation in the vicinity of Hill 571.

(b) The 2d Inf. will hold the right section, extending from Hill 571 to 100 yards north of HANOVER ROAD, both inclusive. The 3d Inf., less 1st Bn., will hold the left section of the line extending from a point 100 yards north of HANOVER ROAD to the southern extremity of Ridge 560, inclusive. The position will be prepared for defense.

(c) The 1st Inf. will delay the advance of the enemy without becoming seriously engaged, and when forced will uncover the position and assemble under cover in the vicinity of MT. VERNON SCHOOL as general reserve.

(d) The 1st Sq., 1st Cav., will delay the enemy's advance, without becoming seriously engaged, and will retire when forced and cover the right flank. The YORK PIKE and the roads leading from MUMMASBURG will be closely observed.

4. The 1st Bn., 3d Inf., will continue as train guard. The field trains and convoy will proceed with all possible dispatch to HANOVER and park. Empty combat wagons will park in the vicinity of 484. A dressing station will be established near MT. VERNON SCHOOL.

5. Messages to MT. VERNON SCHOOL.

B, *Brig. Gen.*

Dictated to Comdrs. 2d Inf., 3d Inf., 1st Bn., 1st F. A., Com. Co. No. 1.

Copy by mounted messenger
  Commanding officers—
    1st Sq., 1st Cav.;
    1st Inf.;
    1st Bn., 3d Inf.;
    Officer in charge of trains.

Report of dispositions by wire to division commander and commanding officer, 3d Brigade, via motor to HANOVER.

5. *Orders for Retreat.*

Detachment, I Division,
KEYMAR, MD.,
1 May 15, 11-00 p. m.

Field Orders
No. —

Gettysburg General Map.
Emmitsburg-Taneytown G. S. Maps, $^1/_{62500}$

Troops:
(a) Leading Troops:
1 foot det. Co. A, 1st Engrs.
(b) Main Body, in order of march:
2d Inf.
3d Inf. (less 1 bn.)
Btry. A 5th F. A.
1 bn. 3d Inf.
(c) Rear Guard: Col. A.
1st Inf.
1st Sq. 1st Cav.
1st Bn. 1st L. A.
Co. A Engrs. (less 1 foot det.)
1st Amb. Co.
(d) Detachment: Major E.
1st Bn. Engrs. (less Co. A)
(e) Signal Troops: Capt. A.
½ 1st Aero Co.
2 secs. Sig.

1. The enemy has halted for the night in and west of WESTMINSTER, with outpost on the line WEISHAARS MILL—WALLS MILL. His cavalry blocked our patrols on the line WEISHAARS MILL—MAYBERRY. Elsewhere, roads were clear at dark as far as UNION MILLS and NEW WINDSOR. To-morrow morning our patrols are to reconnoiter along TANEYTOWN ROAD and WESTERN MARYLAND R. R. towards WESTMINSTER.

2. This detachment will retire to-morrow toward APPOLDS, via NAILORS MILL — FRANKLIN SCHOOL, meanwhile delaying the enemy's advance.

3. (a) The leading troops will precede the main body by ½ mile.

(b) The head of the main body will leave the roadfork ¼ mile south of NAILORS MILL at 4-30 A. M., and precede the rear guard by two miles. Btry. A 5th Hv. A., will reconnoiter positions between 488 and B. M. 447.

(c) The rear guard will delay the enemy, without becoming seriously engaged. The first delay will be effected from the vicinity of the present outpost position. The rear guard will observe closely the UNION BRIDGE—LE GORE BRIDGE road.

(d) South of the WESTERN MARYLAND R. R., westward of KEYMAR and to include STULES FORD, and north of KEYSVILLE to BRIDGEPORT inclusive, the engineer detachment will make the necessary preparations and prevent the enemy from seizing bridges and fords in passable condition. No demolitions will be executed without necessity.

(e) The ½ 1st Aero Co. will follow the division trains to GRACEHAM. Two aviators will fly at 5-30 A. M., to determine the direction of march or location of the hostile main body. Lines of information will be established between these headquarters and the rear guard commander and the KEYMAR telephone exchange.

(x) The outpost stands relieved at 4-30 a. m.

4. Ammunition and sanitary trains (less 1st Amb. Co.) will march to GRACEHAM at 5-30 a. m., in the order named. Field trains will assemble with head of column in DETOUR, at 4-30 a. m., and then march to GRACEHAM.

5. I shall be on HILL 500, ¼ mile west of KEYMAR.

A, *Brig. Gen.*

Copies to C. O.—
1st Inf.;
2d Inf.;
3d Inf.;
Artillery;
1st Sq., 1st Cav.;
1st Bn., Engrs.;
Signal Troops;
Sanitary Troops.
1st Am. Co.
Contents to division commander by telegraph.

Appendix I

The trench sections[1] shown in the accompanying diagrams are mainly those of the various field manuals in existence at the beginning of the present war in Europe modified by the information now available for publication. The constant tendency is toward deeper and narrower trenches and more complete concealment which is necessary to escape the watchful airplane and the unerring accuracy and dire destruction of the high-explosive shell. This necessity was foreseen prior to this war, as shown in the following interesting summary from Captain Thuillier's valuable and instructive work on the "Principles of Land Defense," published in 1902, but it has taken actual hard experience to bring the fact home to the individual combatants and to make it a guiding principle of their daily life:

> The absolute necessity for rendering all works invisible from a distance or of misleading the enemy as to their situation has already been repeatedly pointed out. The method of doing this will be dependent entirely on the nature of the ground. Low commands are necessary and also as a rule some kind of background. Smooth turfed slopes are quite inadmissible and the ends of parapets or banks as seen from the

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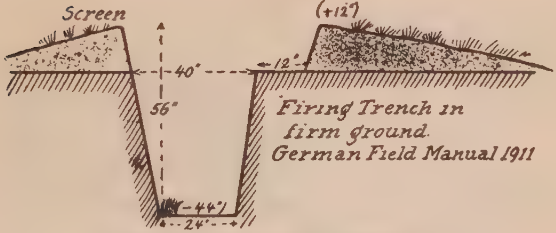
[1] The trenches prescribed by U. S. Field Service Regulations are shown in Vol. IV this series.

front should be gently sloping or blended with the ground. Steep frontal slopes are also generally easily visible, so all should be gentle and irregular. The surface of all disturbed soil such as parapets, etc., should be made to resemble the surrounding ground. If the latter is grassed the parapet should be grassed, if cultivated there should be cultivation right up to the crest of the parapet and again on the background. If the country is bare and barren, with rocks and shrubs, similar features must be reproduced on the parapets. Shrubs or bushes on an infantry parapet, if not too close together will not obstruct the defenders' fire. With modern rifles the defenders may be several paces apart so they can take up positions where they can see between the bushes. Such bushes, however, will make it much harder for the enemy to discover the defenders and even guns may be concealed in this manner.

When planning methods of concealment or for locating works so as to secure invisibility it is essential for the designer to study from the map or the ground, if possible, the positions that may be occupied by the enemy. The same argument applies to the selection of defensive positions and the design and location of works. The ground that the attackers may occupy and over which he may advance must be most carefully studied. Possible battery locations, observation stations, communications both lateral and from front to rear must be noted and the probable dispositions of the attacker estimated. All ground hidden from the defensive position must be noted and the possibility of bringing enfilade or indirect fire on it from other parts of the defender's line must be ascertained. In brief study the attacker's ground as well as your own and the converse is just as important for those planning to make an attack. Both sides must be duly considered.

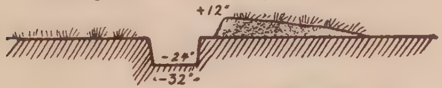
Appendix

TYPICAL GERMAN TRENCHES 1911 TO THE PRESENT

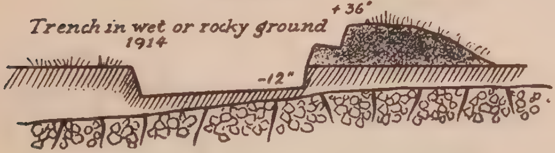


Firing Trench in firm ground.
German Field Manual 1911

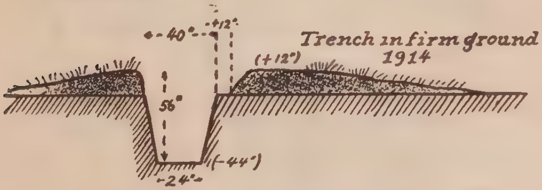
Kneeling Trench in firm ground 1914



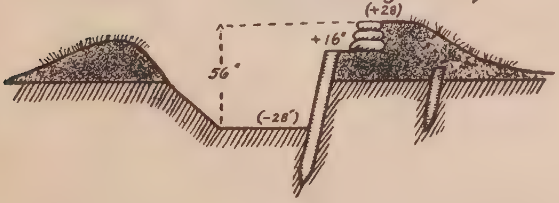
Trench in wet or rocky ground
1914

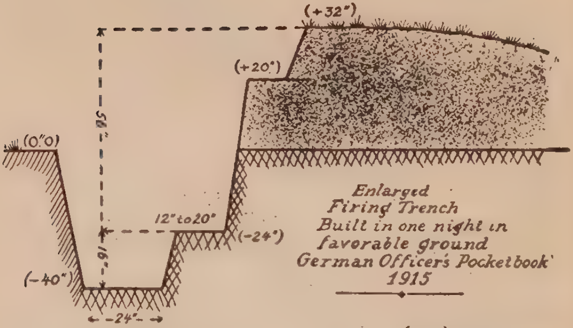


Trench in firm ground
1914

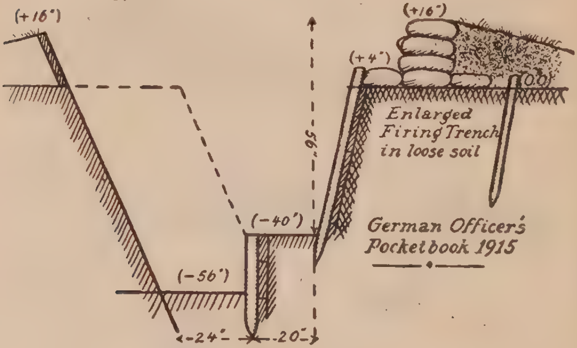


In unstable ground 1914.





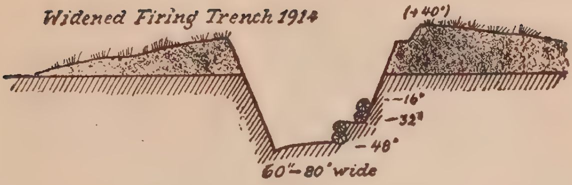
Enlarged Firing Trench Built in one night in favorable ground German Officer's Pocketbook 1915

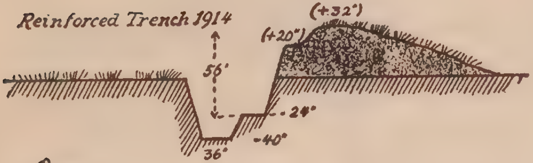


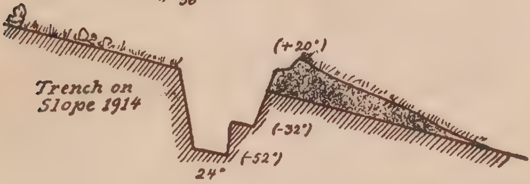
Enlarged Firing Trench in loose soil

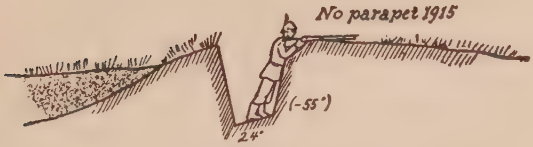
German Officer's Pocketbook 1915

Appendix

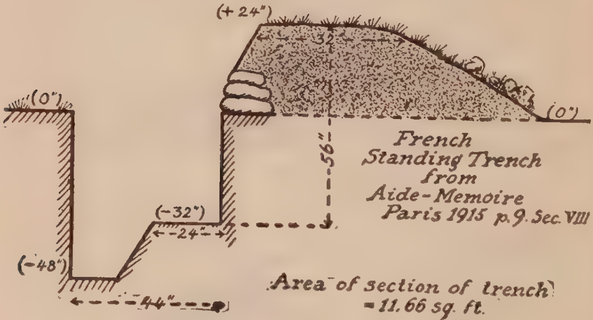

Widened Firing Trench 1914
(+40")
--16"
-32"
-48"
60"-80" wide


Reinforced Trench 1914
(+32")
(+20")
56"
- - 24"
-40"
36"


Trench on Slope 1914
(+20")
(-32")
(-52")
24"

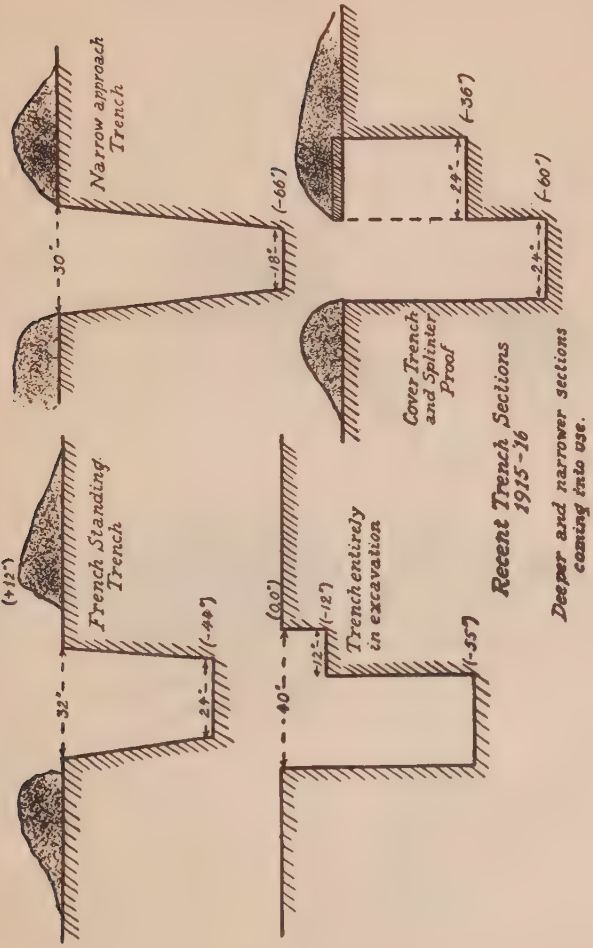

No parapet 1915
(-55")
24"

TYPICAL FRENCH TRENCHES NOW IN USE



French Standing Trench from Aide-Memoire Paris 1915 p. 9. Sec. VIII

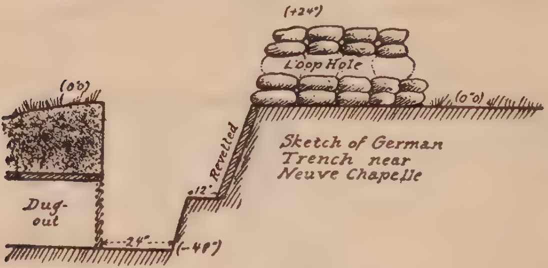
Area of section of trench = 11.66 sq. ft.

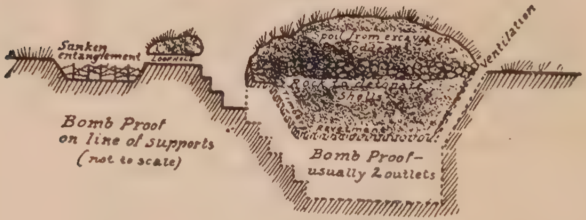


Recent Trench Sections
1915-'16

Deeper and narrower sections coming into use.

Bombproof on Line Supports (not to scale)





Appendix II

ABBREVIATIONS AND SIGNS USED ON FIELD MAPS AND SKETCHES

The following abbreviations and signs are authorized for use on field maps and sketches. For more elaborate map work the authorized conventional signs as given in the manual of Conventional Signs, United States Army Maps, are used.

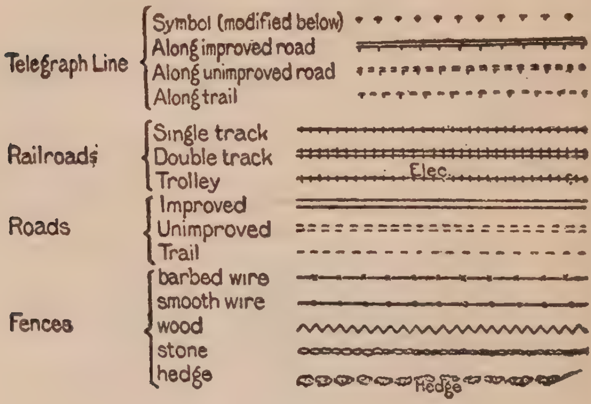
Abbreviations other than those given should not be used.

ABBREVIATIONS

A.	Arroyo.
abut.	Abutment.
Ar.	Arch.
b.	Brick.
B. S.	Blacksmith Shop.
bot.	Bottom.
Br.	Branch.
br.	Bridge.
C.	Cape.
cem.	Cemetery.
con.	Concrete.
cov.	Covered.
Cr.	Creek.
d.	Deep.
cul.	Culvert.
D. S.	Drug Store.
E.	East.
Est.	Estuary.
f.	Fordable.
Ft.	Fort.
G. S.	General store.
L. S. S.	Life saving station.
L. H.	Lighthouse.
Long.	Longitude.
Mt.	Mountain.
Mts.	Mountains.
N.	North.
n. f.	Not fordable.
P.	Pier.
pk.	Plank.
P. O.	Post office.
Pt.	Point.
q. p.	Queen post
R.	River.
R. H.	Roundhouse.
R. R.	Railroad.
S.	South.
s.	Steel.
S. H.	Schoolhouse.
S. M.	Sawmill.
Sta.	Station.
st.	Stone.

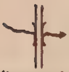
gir.	Girder.
G. M.	Gristmill.
i.	Iron.
I.	Island.
Jc.	Junction.
k.p.	King post.
L.	Lake.
Lat.	Latitude.
Ldg.	Landing.
str.	Stream.
T. G.	Tollgate.
Tres.	Trestle.
tr.	Truss.
W. T.	Water tank.
W. W.	Water works.
W.	West.
w.	Wood.
wd.	Wide.

SIGNS



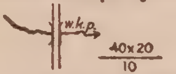
SIGNS

Bridge



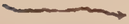
Indicate character and span by abbreviations.

Example:



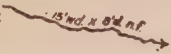
Meaning wooden kingpost bridge, 40 feet long, 20 feet wide, and 10 feet above the water.

Streams



Indicate character by abbreviations.

Example:



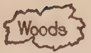
Meaning a stream 15 feet wide, 8 feet deep, and not fordable.

House ▪

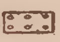
Church ♣

School house ▪S.H.

Woods



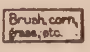
Orchards



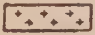
Cultivated Land

If boundary lines are fences they are indicated as such.

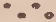
Brush, crops or grass, important as cover or forage



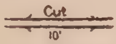
Cemetery



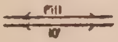
Trees, isolated



Cut and fill —



cut 10 feet deep



fill 10 feet high

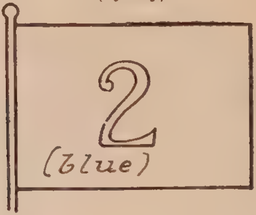
Appendix III

DISTINGUISHING SIGNS IN CAMP AND CANTONMENT

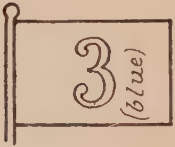
FLAGS

Position of Flag
(by day)

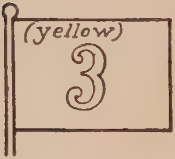
Army Corps Headquarters.



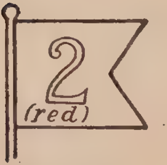
Infantry Division Headquarters.



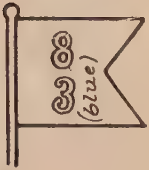
Cavalry Division Headquarters.



Artillery Brigade Headquarters.



Infantry Brigade Headquarters.

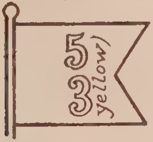


Appendix

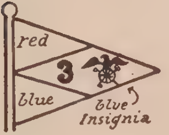
FLAGS

Position of Flag
(by day)

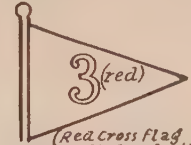
Cavalry Brigade
Headquarters.



Supply Train and
Q. M. Depots

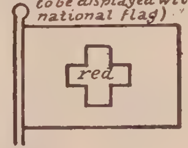


Ammunition Train,
Distributing Points
and Depots

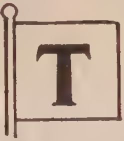


(Red Cross flag
to be displayed with
national flag)

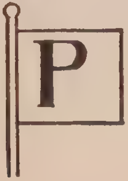
Sanitary Train,
Regimental Aid and Dressing
Station, Sanitary Column,
Hospital, etc.



Telegraph Station

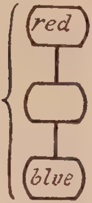


Post Office

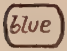


LANTERNS

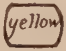
Army Corps Headquarters.



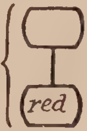
Infantry Division Headquarters.



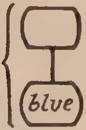
Cavalry Division Headquarters.



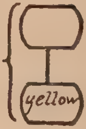
Artillery Brigade Headquarters.



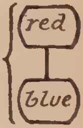
Infantry Brigade Headquarters.



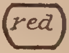
Cavalry Brigade Headquarters.



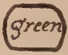
Supply Train and Quartermaster Depots.



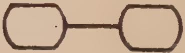
Ammunition Train, Distributing Points, and Depots.



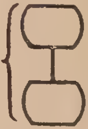
Sanitary Train, Regimental Aid and Dressing Station, Sanitary Column, Hospital, etc.



Telegraph Station.



Post Office.



Note: 1. The various headquarters and stations may also be marked at night by illuminated signs. These may be extemporized when not provided by the quartermaster. Standard signs provided by the quartermaster should be printed in white on pieces of black waxed oilcloth, about 20 by 15 inches.

2. The extensive use of signs in large camps is very necessary to prevent confusion and delays. The signs required may be extemporized.

3. Some samples of useful signs follow. These may be illuminated at night.

WATER →Well ¾ mi.→ FOR MEN	WATER ←Stream ½ mi.— FOR STOCK	DRESSING STATION ←1 mile—
HDQRS. 1st BRIGADE 2nd Division 3rd Corps	HDQRS. 1st Division 2nd Corps	HDQRS. FIRST Army Corps
HDQRS. 1st BRIGADE 2nd Cav. Div.	HDQRS. 1st BRIGADE Field Artillery	QM. SUPPLY DEPOT 1st Division
Ammunition DEPOT 1st Division	TELEGRAPH OFFICE	POST OFFICE

Appendix IV

AUTHORIZED ABBREVIATIONS

Tactical Organizations:

III. Div.	Third Infantry Division.
I Cav. Div.	First Cavalry Division.
1st Sep. Brig.	First Separate Brigade.
8th Brig. III Div.	Eighth Infantry Brigade of the Third Infantry Division.
2d Brig. I Cav. Div.	Second Brigade of the First Cavalry Division.
4th Brig. F. A.	Fourth Brigade of Field Artillery.
5th F. A. (Hv.)	Fifth Regiment of Heavy Artillery.
4th F. A. (Mt.)	Fourth Regiment of Mountain Artillery.
3d F. A. (Light)	Third Regiment of Light Artillery.
6th F. A. (Horse)	Sixth Regiment of Horse Artillery.
1st Pon. Bn.	First Pontoon Battalion.
1st Aero Sq.	First Aero Squadron.
3d Inf.	Third Regiment of Infantry.
2d Cav.	Second Regiment of Cavalry.
1st Engrs.	First Regiment of Engineers.
2d Mtd. Bn. Engrs.	Second Mounted Battalion of Engineers.
2 m. g. cos.	Two machine-gun companies.
1 m. g. tr.	One machine-gun troop.
1st Bn. Sig.	First Field Battalion Signal Troops.
1st Bn. Sig. Cav.	First Field Battalion Signal Troops, Cavalry.
1st Tel. Bn.	First Telegraph Battalion.

Trains:

C. Tn.	Combat train.
F. Tn.	Field train.

B. Sec. F. Tn.	Baggage section field train.
R. Sec. F. Tn.	Ration section field train.
Am. Tn.	Ammunition train.
Sp. Tn.	Supply train.
Sn. Tn.	Sanitary train.
Engr. Tn.	Engineer train.
Amb. Co. No. 1	Ambulance Company Number One.
F. Hosp. No. 2	Field Hospital Number Two.

Columns:

L. of C.	Line of communication.
Am. Col.	Ammunition column.
Sp. Col.	Supply column.
Sn. Col.	Sanitary column.
Engr. Col.	Engineer column.

Signal:

1 wire sec. Sig.
1 wire plat. Sig.

Miscellaneous:

Adj.	Adjutant.
A. D. of Ry.	Assistant Director of Railways.
Am.	Ammunition.
Adv. Gd.	Advance guard.
Adv. Sec. L. of C.	Advance section, line of communications.
Asst. C. of S.	Assistant Chief of Staff.
Base Sec. L. of C.	Base section, line of communications.
Brig. Gen.	Brigadier general.
Capt.	Captain.
C. G.	Commanding general.
C. G. L. of C.	Commanding general, line of communications.
C. O.	Commanding officer.
Col.	Colonel.
C. of S.	Chief of Staff.
Comdg.	Commanding.
Comb. Sec. G. S.	Combat section, General Staff.
Detch.	Detachment.
D. of Ry.	Director of railways.

E. O.	Engineer officer.
F. O.	Field order.
F. S. R.	Field Service Regulations.
Gd.	Guards.
Gen.	General.
G. O.	General order.
Insp.	Inspector.
Int. Sec. G. S.	Intelligence section, General Staff.
Inter Sec. L. of C.	Intermediate section, line of communications.
J. A.	Judge advocate.
L. of C.	Line of communications.
Lt.	Lieutenant.
Lt. Col.	Lieutenant colonel.
Lt. Gen.	Lieutenant general.
Maj.	Major.
Maj. Gen.	Major general.
M. P.	Military police.
N. C. O.	Noncommissioned officer.
O. O.	Ordnance officer.
Q. M.	Quartermaster.
S. A. Am.	Small-arms' ammunition.
Sig. O.	Signal officer.
S. O.	Special order.
Surg.	Surgeon.

Fractional Oragnizations:

Infantry:

III Div. (less cav. and 1 bn. F. A.)
2d Brig. (less 1 regt.)
1st Inf. (less 6 cos. and M. G. Co.)
1 bn. 6th Inf.
1st Bn. 6th Inf. (less 1 co.)
Co. A 1st Inf. (less 1 plat.)

Cavalry:

I Cav. Div. (less 1 brig.)
2d Brig. (less 1 regt.)
3d Cav. (less 1 sq. and M. G. detch.)
1 sq. 4th Cav.
1st Sq. 4th Cav. (less 1 tr.)
Tr. C 4th Cav. (less 2 plats.)

Artillery:

3d F. A. (less 1 bn.)
1 bn. 1st F. A. (less 1 btry.)
1st F. A. (less 2 btries.)
Btry. A, 6th F. A. (Horse).
5th F. A. (Hv.) (less 1 bn. 6″ How.)
1 bn. 4.7″ How., 5th F. A. (Hv.)
1 btry. 4.7″ Gun, 5th F. A. (Hv.)
1 bn. 3.8″ Gun, 36th F. A.

Engineers:

1st Bn., 3d Engrs. (less 1 co.)
Co. A Engrs. (less 1 sec.)
2 secs. Engrs.
1st Pon. Bn. (less 1 co. heavy equip.)
1 pon. co. light equip. (less 2 bridge div.)

Signal:

1st Bn. Sig. (less 1 wire plat.)
1 rad. co. Sig.
1 wire co. Sig.
1 rad. sec. pack, Sig.
1 rad. plat. wagon, Sig.

Miscellaneous:

Det..............Detachment.

Note: The suffixes (Hv.), (Mt.) and (Horse) for Field Artillery are ordinarily omitted, but may be used where distinction is essential.

Appendix V

MISCELLANEOUS DATA

1. *Ranges:* For convenience of reference ranges are classified as follows:

Range	Rifle, yards	Field artillery, yards	Heavy artillery, yards
Distant	Over 2,000	6,500 to 5,000	10,000 to 6,500
Long	2,000 to 1,400	5,000 to 4,000	6,500 to 5,000
Effective	1,400 to 600	4,000 to 2,500	5,000 to 2,500
Close	Under 600	Under 2,500	Under 2,500

The ground effectively covered by shrapnel is elliptical in form and at effective ranges does not exceed 200 yards in depth by 25 yards in width.

2. *Penetration of rifle bullet:*

Material	Inches	
	200 yards	600 yards
Commercial steel	0.30	0.20
1-inch broken stone gravel	4.80	4.28
Hard coal between 1-inch boards	9.00	7.00
Brick masonry, cement[1]	2.20	1.16
Brick masonry, lime[1]	2.40	1.14
Sand, dry[2]	18.18	11.96
Concrete, Port. 1-3-5	3.00	1.86
Oak	26.46	12.46
Sand, wet	30.00	13.00
Pine	25.72	13.00
Earth, loam	30.00	16.12
Greasy clay	60.00	32.00

[1] For single shot.

[2] In sacks, about one-half these figures.

3. *Effect of artillery fire:* Up to 3,000 yards, the 3-inch field gun, using high-explosive shell, is effective against ordinary types of overhead cover for field trenches, brick buildings, and stone walls 2 feet thick. It is ineffective against earthen parapets.

The heavier types of field guns and howitzers are effective against all kinds of field works, and protection against this kind of fire must be secured by concealment.

4. *Communicating radius of Signal Corps equipment:*

Field battalion signal troops (infantry division)—
  1 wire company—
    4 wire sets (reel carts) 20 miles (total).
  1 radio company—
    2 radio sets (wheel) 200 miles radius.
    2 radio sets (pack) 30 miles radius.
Field battalion signal troops (cavalry division)—
  1 headquarters company—
    2 radio sets (wheel) 200 miles radius.
    2 wire sets (reel carts) 10 miles (total).
  1 radio company—
    4 radio sets (pack) 30 miles radius.

5. *Length of bridges:*

(Light equipage) bridge division, each 185 ft.
(Heavy equipage) bridge division, each 225 ft.

6. *Capacity of field hospital company and evacuation hospital:*

Field hospital company, number of beds in equipment,[1] 216.

Evacuation hospital, number of beds in equipment,[1] 324.

7. *Average net cargoes of vehicles, pack mules, and transportation units:*

	Pounds.
4-mule army wagon (except that loads on combat trains are fixed at 2,465 pounds)	2,765
Pack mules	250
Autotrucks	3,000
Wagon company	75,000
Autotruck company	80,000
Pack train company (no grain carried)	12,000

8. *Average results of one man hour labor:*

	Cubic feet.[2]
Excavation in easy soil—	
First hour	30
Second hour	25
Third hour	15
Thereafter continuous work	10

In hard soil, about half the above.

In loose earth, 60 cubic feet.

Filling sandbags, 20 bags (0.5 cubic foot each).

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[1] By utilizing local facilities a greater number of patients can be taken care of by personnel.

[2] By working in two reliefs above figures can be increased by one-third.

Revetment construction (material and tools on hand):	Square feet per man hour.
Rough brush wood or plank	40
Brushwood hurdles, rough—	
Making	15
Placing	30
Sandbags—	
Filling	10
Placing	20
Sod—	
Obtaining sod for	7
Placing	10
Obstacle construction (material and tools on hand)—	Linear feet.
Abattis, wired (1 strong row)	1.5
Wire entanglement—	Square feet.
High	27
Low	90
Clearing[1]—	Square yards.
Thickets up to 1.5 inches diameter	25
Light clearings of soft woods, trees to 12 inches in diameter	25
Medium clearing	15

Water—Approximate daily requirements:

1 gallon per man on march.
5 gallons per man in camp.
6 to 10 gallons per animal on march and camp.

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[1] Removal of cuttings in both cases involves an equal amount of labor.

(The foregoing figures apply to water taken from streams, where animals are watered at the streams, and cooking water carried. In estimating the daily supply for permanent or semipermanent camps, where water is piped to kitchens, bathhouses, etc., the requirements will be 25 to 30 gallons per man and 10 to 15 gallons per animal, depending on climatic conditions.)

Slope fractions[1]	Degrees	Operations
$\frac{1}{50}$	1	Maximum for railroads.
$\frac{1}{20}$	3	Maximum for first-class roads.
$\frac{1}{12}$	5	Practicable for all arms. Somewhat difficult for cavalry to charge descending.
$\frac{1}{10}$	6	Maximum for cavalry charge in mass ascending. Infantry in close order descends with some difficulty.
$\frac{1}{8}$		Cavalry can descend at a trot.
$\frac{1}{7}$	8	Not practicable for heavily loaded vehicles.
$\frac{1}{6}$	9½	Field artillery can no longer maneuver.
$\frac{1}{4}$	14-15	Maximum up to which all arms can move.
$\frac{1}{3}$	18½	Light vehicles can ascend.
$\frac{1}{2}$	26	Individuals and mules can ascend or descend.
$\frac{1}{1}$	45	Foot troops can ascend or descend aided by hands.

Estimating quantity of water in stream:

B × D × V × 10,800 = gallons in 24 hours. B = average width, D = average depth, V = average velocity (all in feet).

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[1] Natural tangent of angle between slope and horizontal; read 1 on 50, etc.

10. *Practicability of slopes:* Slopes from 0° to 5° are practicable for maneuvering all arms, singly or combined.

On slopes from 5° to 10° all arms can still be maneuvered, but with increasing difficulty.

On slopes from 10° to 15° all arms can be moved up or down.

Slopes from 15° to 30° are practicable for small detachments only.

On slopes from 30° to 45° foot troops can move with difficulty.

War material can be dragged up any slope (see table p. 350, *ante*).

11. *Fords, practicable depth:*

3—3.5 feet deep for infantry.
4—4.5 feet deep for cavalry.
3 feet deep for artillery.
2.3 feet deep for wagons.

Depending on current and nature of bottom.

12. *Stream flow:*

Velocity in miles = 0.7 of velocity in feet per second.

13. *Strength of ice:*

3 inches thick will support small group of men.
4½ to 7 inches thick will support cavalry and light guns.
8 to 12 inches thick will support heavy guns and wagons.

14. *Estimating transport capacity of ships:*

Allow 3 to 4 gross tons per man and 8 to 10 per animal for ships of more than 5,000 tons, and 4 to 5 per man and 10 to 12 per animal for smaller ship. This allowance includes rations, water, forage, etc., for the voyage and a margin for reserved supplies. The tonnage allowance for animals is sufficient to provide for vehicles, it being assumed that no vehicle will be separated from its draft animals, and that the integrity of units is preserved as far as possible. The gross tonnage of a ship is her total internal space capacity, which is completely closed in and protected from sea and weather, measured in register tons. A register ton is 100 cubic feet.

A ship's ton on which basis freight is computed is 40 cubic feet.

15. *Time by compass bearing* (approximate):

Take true azimuth (or bearing) of sun (T. A.); (T. A.—180°) 4-60 = hours before or after 12 o'clock.

16. *Use of watch as compass* (approximate):

Direct hour hand toward sun. A bearing half way between hour hand and the 12 o'clock mark on the watch is the true south.

Appendix VI

SELECTIVE DRAFT MILITARY BILL

Text as finally agreed upon by Senate and House Conferees, May 10, 1917.

To authorize the President to increase temporarily the military establishment of the United States.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in view of the existing emergency, which demands the raising of troops in addition to those now available, the President be, and he is hereby authorized—

First—Immediately to raise, organize, officer, and equip all or such number of increments of the regular army provided by the National Defense Act, approved June 3, 1916, or such parts thereof as he may deem necessary; to raise all organizations of the regular army, including those added by such increments, to the maximum enlisted strength authorized by law. Vacancies in the regular army created or caused by the addition of increments as herein authorized which cannot be filled by promotion may be filled by temporary appointment for the period of the emergency or until replaced by permanent appointments or by professional appointments made under the provisions of section 23 of the National Defense Act, approved June 3, 1916, and hereafter provisional appointments under said section may be terminated whenever it is determined, in the manner prescribed by the President, that the officer has not the suitability and fitness requisite for permanent appointment.

Second—To draft into the military service of the United States, organize and officer, in accordance with the provisions of section 11 of said National Defense Act, so far as the provisions of said section may be applicable and not inconsistent with the terms of this act, any or all members of the National Guard and of the National Guard reserves, and said members so drafted into the military service of the United States shall serve therein for the period of the existing emergency unless sooner discharged. *Provided,* That when so drafted the organizations or units of the National Guard shall, so far as practicable, retain the State designations of their respective organizations.

Third—To raise by draft, as herein provided, organize and equip an additional force of 500.000 enlisted men, or such part or parts thereof as he may at any time deem necessary, and to provide the necessary officers, line and staff, for said force and for organizations of the other forces hereby authorized, or by combining organizations of said other forces, by ordering members of the Officers' Reserve Corps to temporary duty in accordance with the provisions of section 38 of the National Defense Act, approved June 3, 1916, by appointment from the regular army, the Officers' Reserve Corps, from those duly qualified and registered pursuant to section 23 of the act of Congress approved January 21, 1903 (32d Statutes at Large, page 775), from the members of the National Guard drafted into the service of the United States, from those who have been graduated from educational institutions at which military instruction is compulsory, or from those who have had honorable service in the regular army, the National Guard or in the volunteer forces, or from the country at large; by assigning retired officers of the regular army to active duty with such force with their rank on the retired list and the full pay and allowances of their grade; or by the appointment of retired officers and enlisted men, active or retired, of the regular army as commissioned officers in such forces. *Provided,* That the organization of said force shall be the same as that of the corresponding organizations of the regular army.

Provided further, That the President is authorized to increase or decrease the number of organizations prescribed for the typical brigades, divisions, or army corps of the regular army, and to prescribe such new and different organizations and personnel for army corps, divisions, brigades, regiments, battalions, squadrons, companies, troops and batteries as the efficiency of the service may require.

Provided further, That the number of organizations in a regiment shall not be increased nor shall the number of regiments be decreased.

Provided further, That the President in his discretion may organize, officer and equip for each infantry and cavalry brigade three machine-gun companies, and for each infantry and cavalry division four machine-gun companies, all in addition to the machine-gun companies comprised in organizations included in such brigades and divisions.

Provided further, That the President in his discretion may organize for each division one armored motor car machine-gun company. The machine-gun companies organized under this section shall consist of such commissioned and enlisted personnel and be equipped in such manner as the President may prescribe; and

Provided further, That officers with rank not above that of colonel shall be appointed by the President at once, and officers above that grade by the President, by and with the advice and consent of the Senate.

Provided further, That the President may, in his discretion, recommission in the Coast Guard persons who have heretofore held commissions in the Revenue Cutter Service or the Coast Guard and have left the service honorably, after ascertaining that they are qualified for service physically, morally, and as to age and military fitness.

Fourth—The President is further authorized, in his discretion and at such time as he may determine, to raise and begin the training of an additional force of 500,000 men, organized, officered and equipped as provided for the first mentioned in the preceding paragraph of this section.

Fifth—To raise by draft, organize, equip and officer, as provided in the third paragraph of this section, in addition to and for each of the above forces, such recruit training units as he may deem necessary for the maintenance of such forces at the maximum strength.

Sixth—To raise, organize, officer and maintain during the emergency such number of ammunition batteries and battalions, depot batteries and battalions, and such artillery parks, with such numbers and grades or personnel as he may deem necessary. Such organizations shall be officered in the manner provided in the third paragraph of this section, and enlisted men may be assigned to said organizations from any of the forces herein provided for or raised by selective draft as by this act provided.

Section 2. That the enlisted men required to raise and maintain the organizations of the regular army and to complete and maintain the organizations embodying the members of the National Guard drafted into the service of the United States at the maximum legal strength as by this act provided, shall be raised by voluntary enlistment, or if and whenever the President decides that they cannot effectually be so raised or maintained, then by selective draft; and all other forces hereby authorized shall be raised and maintained by selective draft exclusively; but this provision shall not prevent the transfer to any force of training cadres from other forces. Such draft as herein provided shall be based upon liability to military service of all male citizens or male persons not alien enemies who have declared their intention to become citizens, between the ages of twenty-one and thirty years, both inclusive, and shall take place and be maintained under such regulations as the President may prescribe not inconsistent with the terms of this act.

Quotas for the several States, Territories, and the District of Columbia, or subdivisions thereof, shall be determined in proportion to the population thereof, and credit shall be given to any State, Territory, District, or subdivision thereof for the number of men who were in the military service of the United States as members of the National Guard on April 1, 1917, or who have since said date entered the military service of the United States from any such State, Territory, District or subdivision, either as members of the regular army or the National Guard.

All persons drafted into the service of the United States and all officers accepting commissions in the forces herein provided for shall, from the date of said draft or acceptance, be subject to the laws and regulations governing the regular army, except as to promotions, so far as such laws and regulations are applicable to persons whose permanent retention in the military service on the active or retired list is not contemplated by existing law, and those drafted shall be required to serve for the period of the existing emergency unless sooner discharged.

Provided, That the President is authorized to raise and maintain by voluntary enlistment or draft, as herein provided, special and technical troops as he may deem necessary, and to embody them into organizations and to officer them as provided in the third paragraph of section 1 and section 9 of this act. Organizations of the forces herein provided for, except the regular army, shall, as far as the interests of the service permit, be composed of men who come, and of officers who are appointed from, the same State or locality.

Section 3. No bounty shall be paid to induce any person to enlist in the military service of the United States; and no person liable to military service shall hereafter be permitted or allowed to furnish a substitute for such service; nor shall any substitute be received, enlisted, or enrolled in the military service of the United States; and no such person shall be permitted to escape such service or to be discharged therefrom prior to the expiration of his term of service by the payment of money or any other valuable thing whatsoever as consideration for his release from military service or liability thereto.

Section 4. That the Vice President of the United States, the officers, legislative, executive, and judicial, of the United States and of the several States, Territories, and the District of Columbia, regular or duly ordained ministers of religion, students who at the time of the approval of this act are preparing for the ministry in recognized theological or divinity schools, and all persons in the military and naval service of the United States shall be exempt from the selective draft herein prescribed; and nothing in this act contained shall be construed to require or compel any person to serve in any of the forces herein provided for who is found to be a member of any well-recognized religious sect or organization at present organized and existing and whose existing creed or principles forbid its members to participate in war in any form and whose religious convictions are against war or participation therein in accordance with the creed or principles of said religious organization, but no person so exempted shall be exempted from service in any capacity that the President shall declare to be a noncombatant; and the President is hereby authorized to exclude or discharge from said selective draft and from the draft under the second paragraph of section 1 hereof, or to draft for partial military service only from those liable to draft as in this act provided, persons of the following classes:

County and municipal officials, Customhouse clerks, persons employed by the United States in the transmission of the mails, artificers and workmen employed in the armories, arsenals, and navy yards of the United States, and such other persons employed in the service of the United States as the President may designate;

pilots, mariners actually employed in the sea service of any citizen or merchant within the United States, persons engaged in industries, including agriculture, found to be necessary to the maintenance of the military establishment or the effective operation of the military forces or the maintenance of national interests during the emergency; those in a status with respect to persons dependent upon them for support which renders their exclusion or discharge advisable, and those found to be physically or morally deficient.

No exemption or exclusion shall continue when a cause therefor no longer exists. *Provided*, That notwithstanding the exemptions enumerated herein, each State, Territory, and the District of Columbia shall be required to supply its quota in the proportion that its population bears to the total population of the United States.

The President is hereby authorized in his discretion to create and establish throughout the several States and subdivisions thereof and in the Territories and the District of Columbia local boards, and where, in his discretion, practicable and desirable, there shall be created and established one such local board in each county or similar subdivision in each State, and one for approximately each 30,000 of population in each city of 30,000 population or over, according to the last census taken or estimates furnished by the Bureau of Census of the Department of Commerce.

Such boards shall be appointed by the President, and shall consist of three or more members, no one of whom shall be connected with the military establishment, to be chosen from among the local authorities of such subdivisions or from others residing in the subdivision or area in which the respective boards will have jurisdiction under the rules and regulations prescribed by the President.

Such boards shall have power within their respective jurisdictions. to hear and determine, subject to review as hereinafter provided, all questions of exemption under this act, and all questions of or claims for including or discharging individuals or classes of individuals from the selective draft which shall be made under rules and regulations prescribed by the President, except any and every question or claim for including or excluding or discharging persons or classes of persons from the selective draft under the provisions of this act, authorizing the President to exclude or discharge from the selective draft:

Persons engaged in industries, including agriculture found to be necessary to the maintenance of the military establishment or the effective operation of the military forces or the maintenance of national interest during the emergency.

The President is hereby authorized to establish additional boards, one in each Federal judicial district of the United States, consisting of such number of citizens, not connected with the military establishment, as the President may determine, who shall be appointed by the President.

The President is hereby authorized, in his discretion, to establish more than one such board in any of the Federal judicial districts of the United States or to establish one such board having jurisdiction of an area extending into more than one of the Federal judicial districts.

Such district boards shall review on appeal and affirm, modify or reverse any decision of any local board having jurisdiction in the area in which any such district board has jurisdiction under the rules and regulations prescribed by the President. Such district boards shall have exclusive original jurisdiction within their respective areas to hear and determine all questions or claims for including or excluding or discharging persons or classes of persons from the selective draft, under the provisions of this act, not included within the original jurisdiction of such local boards.

The decision of such district boards shall be final except that, in accordance with such rules and regulations as the President may prescribe, he may affirm, modify or reverse any such decision.

Any vacancy in any such local board or district board shall be filled by the President, and any member of any such local board or district board may be removed and another appointed in his place by the President whenever he considers that the interests of the nation demand it.

The President shall make rules and regulations governing the organization and procedure of such local boards and district boards, and providing for and governing appeals from such local boards to such district boards and reviews of the decisions of any local board by the district board having jurisdiction, and determining and prescribing the several areas in which the respective local boards and district boards shall have jurisdiction, and all other rules and regulations necessary to carry out the terms and provisions of this section, and shall provide for the issuance of certificates of exemption, or partial or limited exemptions, and for a system to exclude and discharge individuals from selective draft.

Section 5. That all male persons between the ages of twenty-one and thirty, both inclusive, shall be subject to registration in accordance with regulations to be prescribed by the President; and upon proclamation by the President or other public notice given by him, or by his direction, stating the time and place of such registration, it shall be the duty of all persons of the designated ages, except officers and enlisted men of the regular army, the navy, and the National Guard and Naval Militia while in the service of the United States, to present themselves for and submit to registration under the provisions of this act.

And every such person shall be deemed to have notice of the requirements of this act upon the publication of said proclamation or other notice as aforesaid given by the President or by his direction. And any person who shall willfully fail or refuse to present himself for registration or to submit thereto as herein provided shall be guilty of a misdemeanor and shall upon conviction in the District Court of the United States having jurisdiction thereof, be punished by imprisonment for not more than one year and shall thereupon be duly registered.

Provided, That in the call of the docket precedence shall be given in courts trying the same, to the trial of criminal proceedings under this act. *Provided further,* That persons shall be subject to registration as herein provided who shall not have attained their twenty-first birthday and who shall not have attained their thirty-first birthday on or before the day set for the registration, and all persons so registered shall be and remain subject to draft into the forces hereby authorized unless exempted or excused therefrom as in this act provided. *Provided further,* That in case of temporary absence from actual place of legal residence of any person liable to registration as provided herein such registration may be made by mail under regulations to be prescribed by the President.

Section 6. That the President is hereby authorized to utilize the service of any or all departments and any or all officers or agents of the United States and of the several States, Territories and the District of Columbia, and subdivisions thereof, in the execution of this act, and all officers and agents of the United States or the several States, Territories and subdivisions thereof, and of the District of Columbia, and all persons designated or appointed under regulations prescribed by the President, whether such appointments are made by the President himself or by the governor or other officer of any State or Territory, to perform any duty in the execution of this act are hereby required to perform such duty as the President shall order or direct, and all such officers and agents and persons so designated or appointed shall hereby have full authority for all acts done by them in the execution of this act by the direction of the President.

Correspondence in the execution of this act may be carried in penalty envelopes bearing the frank of the War Department. Any person charged as herein provided with the duty of carrying into effect any of the provisions of this act or the regulations made or directions given thereunder who shall fail or neglect to perform such duty: and any person charged with such duty or having and exercised any authority under said act, regulations or directions who shall knowingly make or be a party to the making of any false or incorrect registration, physical examination, exemption, enlistment, enrollment or muster: and any person who shall make or be a party to the making of any false statement or certificate as to the fitness or liability of himself or any other person for service under the provisions of this act or regulations made by the President thereunder, or otherwise evades or aids another to evade the requirements of this act or of said regulations, or who in any manner shall fail or neglect fully to perform any duty required of him in the execution of this act, shall, if not subject to military law, be guilty of a misdemeanor, and, upon conviction in the District Court of the United States having jurisdiction thereof, be punished by imprisonment for not more than one year, or, if subject to military law, shall be tried by court-martial and suffer such punishment as a court-martial may direct.

Section 7. That the qualifications and conditions for voluntary enlistment as herein provided shall be the same as those prescribed by existing law for enlistments in the regular army, except that recruits must be between the ages of eighteen and forty years, both inclusive at the time of their enlistment; and such enlistments shall be for the period of the emergency unless sooner discharged. All enlistments, including those in the regular army reserve, which are in force on the date of the approval of this act, and which would terminate during the emergency, shall continue in force during the emergency unless sooner discharged; but nothing herein contained shall be construed to shorten the period of any existing enlistment. *Provided,* That all persons enlisted or drafted under any of the provisions of this act shall as far as practicable be grouped into units by States and the political subdivisions of the same. *Provided further,* That all persons who have enlisted since April 1, 1917, either in the regular army or in the National Guard, and all persons who have enlisted in the National Guard since June 3, 1916, upon their application, shall be discharged upon the termination of the existing emergency.

The President may provide for the discharge of any or all enlisted men whose status with respect to dependents renders such discharge advisable, and he may also authorize the employment on any active duty of retired enlisted men of the regular army, either with their rank on the retired list or in higher enlisted grades, and such retired enlisted men shall receive the full pay and allowances of the grades in which they are actively employed.

Section 8. That the President, by and with the advice and consent of the Senate, is authorized to appoint for the period of the existing emergency such general officers of appropriate grades as may be necessary for duty with brigades, divisions, and higher units in which the forces provided for herein may be organized by the President and general officers of appropriate grade for the several Coast Artillery districts. In so far as such appointments may be made from any of the forces herein provided for, the appointees may be selected irrespective of the grades held by them in such forces.

Vacancies in all grades in the regular army resulting from the appointment of officers thereof to higher grades in the forces other than the regular army herein provided for shall be filled by temporary promotions and appointments in the manner prescribed for filling temporary vacancies by section 114 of the National Defense Act, approved June 3, 1916; and officers appointed under the provisions of this act to higher grades in the forces other than the regular army herein provided for shall not vacate their permanent commissions nor be prejudiced in their relative or lineal standing in the regular army.

Section 9. That the appointments authorized and made as provided by the second, third, fourth, fifth, and sixth paragraphs of section 1 and by section 8 of this act, and the temporary appointments in the regular army authorized by the first paragraph of section 1 of this act, shall be for the period of the emergency, unless sooner terminated by discharge or otherwise.

The President is hereby authorized to discharge any officer from the office held by him under such appointment for any cause which, in the judgment of the President, would promote the public service; and the general commanding any division and higher tactical organization or territorial department is authoribed to appoint from time to time military boards of not less than three nor more than five officers of the forces herein provided for to examine into and report upon the capacity, qualifications, conduct and efficiency of any commissioned officer within his command other than officers of the regular army holding permanent or provisional commissions therein.

Each member of such board shall be superior in rank to the officer whose qualifications are to be inquired into, and if the report of such board be adverse to the continuance of any such officer and be approved by the President, such officer shall be discharged from the service at the discretion of the President, with one month's pay and allowances.

Section 10. That all officers and enlisted men of the forces herein provided for other than the regular army shall be in all respects on the same footing as to pay, allowances and pensions as officers and enlisted men of corresponding grades and length of service in the regular army; and commencing June 1, 1917, and continuing until the termination of the emergency, all enlisted men of the army of the United States in active service whose base pay does not exceed $21 per month shall receive an increase of $10 per month; those whose base pay is $24 an increase of $8 per month; those whose base pay is $30, $36, or $40, an increase of $6 per month; and those whose base pay is $45 or more, an increase of $5 per month. *Provided,* That the increases of pay herein authorized shall not enter into the computation of continuous service pay.

Section 11. That all existing restrictions upon the detail, detachment and employment of officers and enlisted men of the regular army are hereby suspended for the period of the present emergency.

Section 12. That the President of the United States as commander in chief of the army is authorized to make such regulations governing the prohibition of alcoholic liquors in or near military camps and to the officers and enlisted men of the army as he may from time to time deem necessary or advisable. *Provided,* That no person, corporation, partnership or association shall sell, supply or have in his or its possession any intoxicating or spirituous liquors at any military station, cantonment, camp, fort, post, officers' or enlisted men's club which is being used at the time for military purposes under this act, but the Secretary of War may make regulations permitting the sale and use of intoxicating liquors for medicinal purposes.

It shall be unlawful to sell any intoxicating liquor, including beer, ale or wine, to any officer or member of the military forces while in uniform, except as herein provided. Any person, corporation, partnership or association violating the provisions of this section or the regulations made thereunder shall, unless otherwise punishable under the Articles of War, be deemed guilty of a misdemeanor and be punished by a fine of not more than $1,000 or imprisonment for not more than twelve months, or both.

Section 13. That the Secretary of War is hereby authorized, empowered and directed during the present war to do everything by him deemed necessary to suppress and prevent the keeping or setting up of houses of ill-fame, brothels or bawdy houses within such distance as he may deem needful of any military camp, station, fort, post, cantonment, training or mobilization place, and any person, corporation, partnership or association receiving or permitting to be received for immoral purposes any person into any place, structure or building used for the purpose of lewdness, assignation or prostitution within such distance of said places as may be designated, or shall permit any such person to remain for immoral purposes in any such place, structure or building as aforesaid, or who shall violate any order, rule or regulation issued to carry out the object and purpose of this section shall, unless otherwise punishable under the Articles of War, be deemed guilty of a misdemeanor and be punished by a fine of not more than $1,000 or imprisonment for not more than twelve months or both.

Section 14. That all laws and parts of laws in conflict with the provisions of this act are hereby suspended during the period of this emergency.

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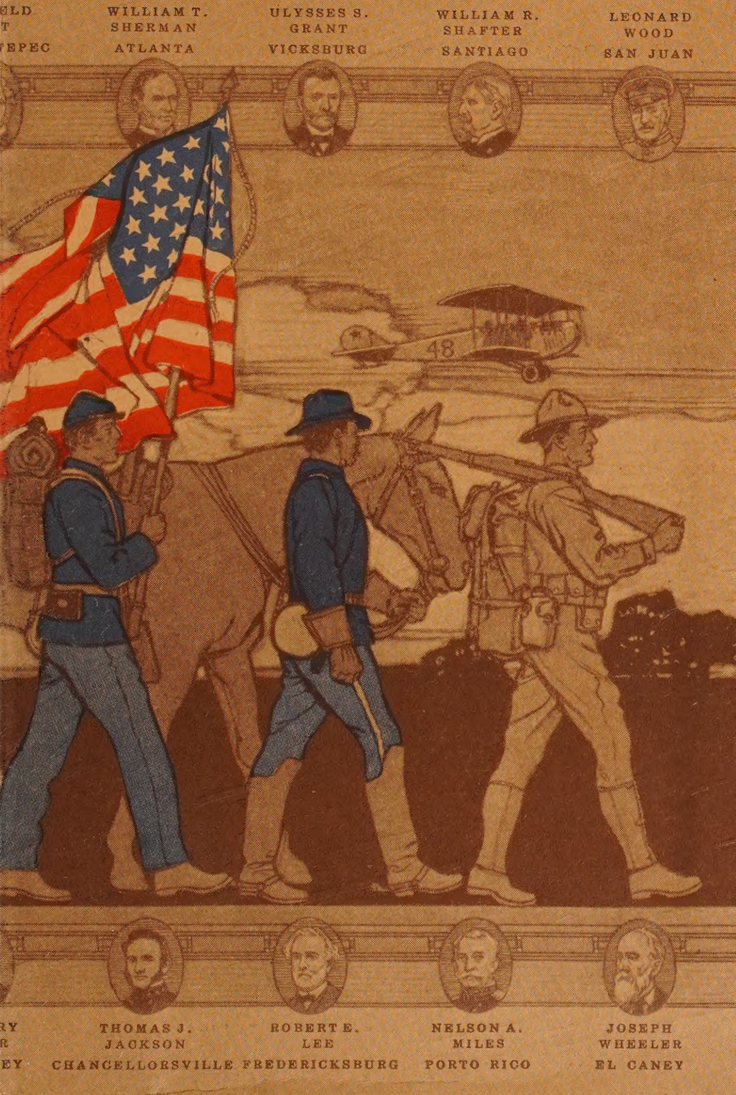
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